REQUEST FOR PROPOSALS

Howard County, Maryland
OFFICE OF PURCHASING
6751 Columbia Gateway Drive, Suite 501
Columbia, Maryland 21046

RFP No. 11-2015

ELECTRIC BUS PROJECT

OPENING: DECEMBER 17, 2014 AT 11:00 AM

PRE-PROPOSAL CONFERENCE: December 4, 2014 at 11:00 AM

BUYER: Dean Hof, Assistant Purchasing Administrator
PHONE: 410-313-4239
EMAIL: dhof@howardcountymd.gov

Outstanding Agency Accreditation Achievement Award NIGP

npi Achievement of Excellence in Procurement 2014 Award Winner

Formal RFPs and RFPs Results are available on the Website:
www.howardcountymd.gov/purchasing

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IMPORTANT: ADVISE THE ISSUING OFFICE IMMEDIATELY
IF ANY OF THE ABOVE SECTIONS ARE NOT ENCLOSED IN THIS DOCUMENT.

SECTION A

KEY INFORMATION SUMMARY

RFP Number:	RFP-11-2015
RFP Name:	Electric Bus Project
Issue Date:	[Posted on Website Date]
Buyer:	Dean Hof dhof@howardcountymd.gov 410-313-4239
Pre-Proposal Date:	December 4, 2014 at 10:00 AM
Pre-Proposal Location and Registration:	Office of Purchasing 6751 Columbia Gateway Drive, Suite 501 Columbia, MD 21046 Please register by contacting Julie Spencer at jspencer@howardcountymd.gov
Questions Due and to Whom:	Questions due no later than 4:00 p.m. on December 9, 2014. Submit questions to: Dean Hof at dhof@howardcountymd.gov Questions must be submitted to the Buyer at the email address listed above.
Proposal Due:	December 17, 2014 at 11:00 AM
Mail/Deliver Proposals to the Issuing Office:	Office of Purchasing 6751 Columbia Gateway Dr., Ste. 501 Columbia, MD 21046 410-313-6370 **PLEASE REMEMBER THAT TECHNICAL AND PRICE PROPOSALS ARE TO BE PLACED IN *SEPARATE* SEALED ENVELOPES.**
Agreement Term:	One year with four one-year renewals.
Bid Deposit/ Performance Bond:	5% Bid Deposit, Performance Bond for Full Amount of Award
EBO Subcontracting Participation:	10% Goal

MINORITY BUSINESS ENTERPRISES are encouraged to respond to this solicitation. For more information, please contact the Equal Business Opportunity Coordinator at 410-313-6370.

IMPORTANT NOTICE REGARDING ADDENDA

Addenda to solicitations often occur prior to bid opening. It is the potential Contractor's responsibility to visit the Office of Purchasing web site for updates to solicitations. www.howardcountymd.gov/purchasing

SECTION B

PURCHASE ORDER TERMS AND CONDITIONS

The following terms and conditions apply to all Purchase Orders issued by Howard County and are applicable to all purchases made as a result of this solicitation.

1 No purchase of materials, supplies, equipment, and/or services will be recognized unless made through the Office of Purchasing.

2 The County may at any time insist upon strict compliance with these terms and conditions, notwithstanding any previous custom, practice or course of dealing to the contrary.

3 The terms and conditions of sale as stated in this Purchase Order govern in the event of conflict with any terms of the Contractor's bid, and are not subject to change by reason of any written or verbal statements by the Contractor or by any terms stated in the Contractor's acknowledgement without prior written authority from the Office of Purchasing.

4 If the price is omitted on the Purchase Order, except where the Purchase Order is given in acceptance of quoted prices, it is agreed that Contractor's price will be the lowest prevailing market price and in no event is this Purchase Order to be filled at higher prices than last previously quoted or charged without prior written authority from the Office of Purchasing.

5 If requested, the Contractor shall acknowledge the order promptly and provide a delivery date.

6 Invoices must show Delivery Address and Purchase Order number, and indicate if it represents partial or complete billing. Separate invoices must be rendered for each Purchase Order. Invoices shall include the following information:

6.1 Contractor's name;
6.2 Address;
6.3 Federal tax identification number;
6.4 Contract number, if applicable (the first two digits are 44XXXXXXXX);
6.5 Purchase Order number (the first digit is 2XXXXXXXXX);
6.6 Contract line number, if applicable;
6.7 Unit price and extended price (if applicable, the unit price must match a line on the Contract); and
6.8 Description of goods provided and/or services performed.

7 The County has the right to refuse to make payment on any invoice unless and until verification of receipt by the County can be determined. The County's payment for any material shall not constitute acceptance of the material or a waiver of any of the County's rights.

8 No freight/delivery/fuel charges will be paid by the County unless specifically provided for in the Purchase Order.

9 The County will not pay for packaging, boxing or cartage. Damage resulting from improperly packaged material will be charged to the Contractor.

10 The County reserves the right to cancel this Purchase Order or, any part thereof, without obligation, if delivery is not made or services completed at the time(s) specified.

11 This Purchase Order shall be governed and construed in accordance with the law of the State of Maryland without regard to any choice of law principles.

12 All deliveries and services furnished under this Purchase Order must be of the quality specified or in the event no quality is specified, must be the best of their respective kinds, and will be subject to inspection and approval of the County within a reasonable time after delivery of goods or completion of services. When manufacturing specifications are referred to in this Purchase Order, such specifications shall be deemed to be an integral part hereof as if duly set out herein. Goods and services shall be replaced at no additional charge to the County if they prove to be defective and/or not in accordance with specifications. Rejected materials shall be returned at the risk and expense of the Contractor. If the County does not desire replacement, the Contractor shall issue a full credit.

13 Requirement as to Materials, Contractor's Responsibilities and Warranties:

13.1 The Contractor warrants and agrees that all materials supplied hereunder shall be manufactured and produced in compliance with the laws, regulations, codes, terms, standards and/or requirements of all Federal, State and local authorities and all other authorities having jurisdiction, and that performance of this Purchase Order shall be in accordance with the above laws, regulations, codes, terms, standards, and/or requirements, and agrees, upon request, to furnish the County a certificate of compliance in such forms as the County may require.

13.2 The Contractor warrants that there has been no violation of copyrights or patent rights in manufacturing, producing, or selling the goods shipped or ordered and Contractor agrees to indemnify and hold the County harmless from any and all liability, loss or expense occasioned by such a violation.

14 The quantity of materials, and/or services, must not be exceeded without prior written authority from the Office of Purchasing.

15 Substitutions are not allowed without prior written authority from the Office of Purchasing.

16 If required, a sufficient number of shop drawings and/or catalog data shall be furnished to the County within 15 days (unless otherwise specified) for necessary approval.

17 In the event any article sold and delivered hereunder shall be defective in any respect whatsoever, the Contractor will indemnify and save harmless the County from all losses or expenses by reason of all accidents, injuries or damages to persons or property resulting from the use of such article or which are contributed to by said defective condition.

18 The Contractor shall indemnify and hold harmless the County, its employees, agents and officials from any and all claims, losses or expenses resulting from any accidents, injuries or damages to persons or properties, suits or demands including reasonable attorney fees which may be made against the County, its employees, agents or officials resulting from any act or omission committed in the performance of the duties imposed by and performed under the terms of this Purchase Order by the Contractor or anyone under agreement with the Contractor to perform duties under this Purchase Order. The Contractor shall not be responsible for acts of negligence or willful misconduct committed by the County, its employees, agents and officials. Any property or work to be provided by the Contractor under this Purchase Order will remain at the Contractor's risk until written acceptance by the County; and the Contractor will replace, at the Contractor's expense, all property or work damaged or destroyed by any cause whatsoever.

19 Liability for Damage: If this Purchase Order calls for work to be performed upon property owned or controlled by the County it is understood and agreed that:

19.1 Mechanic's Liens: The Contractor will keep the premises and work free and clear of all mechanic's liens, and furnish the County certificate and waiver as provided by law.

19.2 Property and Casualty Losses: The work will remain at the Contractor's risk prior to written acceptance by the County and the Contractor will replace at its own expense all work damaged or destroyed by fire, force or violence of the elements or any cause whatsoever.

19.3 Injury to Contractor's Personnel: The Contractor understands and agrees that they are the sole employer of all persons employed by Contractor to perform services under this Purchase Order and agrees on behalf of itself and its workers' compensation insurer that the County is not a dual employer of such personnel. If Contractor is hiring independent contractors or subcontractors to perform services under this Purchase Order, Contractor shall assure that all such persons are properly covered under Maryland workers' compensation law and will indemnify, save harmless and defend the County from all workers' compensation claims filed by such persons against the County.

19.4 Workers' Compensation Insurance: During the term of this Purchase Order, the Contractor will provide workers' compensation insurance in compliance with Maryland law for its employees and shall be responsible to verify workers' compensation coverage for all independent contractors and subcontractors. Contractor shall indemnify the County for any uninsured losses relating to contractual services under this Purchase Order and subsequent amendments.

20 Bankruptcy: In the event of any proceedings, voluntary or involuntary, in bankruptcy or insolvency by or against the Contractor including any proceedings under the Chandler Act, or in the event of the appointment, with or without the Contractor's consent, of an assignee for the benefit of creditors or of a receiver then the County shall be entitled to cancel any unfilled part of this Purchase Order without any liability whatsoever.

21 Equal Employment Opportunity: The County requires that the Contractor not discriminate against any employee or applicant for employment because of race, creed, religion, physical or mental handicap, color, sex, national origin, age, occupation, marital status, political expression, gender identity/expression, sexual orientation or personal appearance. The Contractor will take affirmative action to ensure that applicants are employed, and the employees are treated fairly and equally during employment with regard to the above. The Contractor warrants that, within the previous 12 months, it has not engaged in unlawful employment practices as set forth in Section 12.208 of the Howard County Code, Section 19 of Article 49B of the annotated Code of Maryland or Sections 703 and 704 of Title VII of the Civil Rights Act of 1964.

22 Material Safety Data Sheet (MSDS): If the work to be performed under this Purchase Order requires the use of any product that contains any ingredient that could be hazardous or injurious to a person's health, a MSDS must be provided to the Office of Purchasing, 6751 Columbia Gateway Drive, Suite 501, Columbia, Maryland 21046.

23 Termination

23.1 Termination for Convenience: The County may terminate this Purchase Order, in whole or in part, if the County determines that such termination is in the best interest of the County, without showing cause, upon giving at least 30 days written notice to the Contractor. The County shall pay all reasonable costs incurred by the Contractor up to the date of termination. However, in no event shall the Contractor be paid an amount which exceeds the price bid for the work performed. The Contractor shall not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

23.2 Termination for Default: When the Contractor has not performed or has unsatisfactorily performed one or more material terms of the Purchase Order, the County may terminate the Purchase Order for default. Upon termination for default, payment may be withheld at the discretion of the County. Failure on the part of the Contractor to fulfill the contractual obligations shall be considered just cause for termination of the Purchase Order. If the damages exceed the undisbursed sums available for compensation, the County shall not be obligated to make any further disbursements hereunder. The Contractor will be paid for work satisfactorily performed prior to termination less any excess costs incurred by the County in reprocuring and completing the work.

SECTION C

GENERAL CONDITIONS

1 DEFINITIONS:

1.1 Addenda – Formal alteration of a solicitation or Agreement in writing (When applicable, Addenda are available on the Office of Purchasing website.)
1.2 Alternate Bids – A second bid for a single item that intentionally offers a substitute product or service that varies from the stated specifications
1.3 Buyer – The County's Purchasing Representative for the resulting Agreement
1.4 Agreement – The Request for Proposal documents and any addenda, the Contractor's response to this solicitation, and subsequent Purchase Orders
1.5 County – Howard County, Maryland
1.6 County Purchasing Agent – The Chief Administrative Officer for the County
1.7 Contractor – Any Contractor; most often the successful Contractor
1.8 Designee – Specifically appointed alternate signatory or decision maker
1.9 Equal Business Opportunity (EBO) – The County's minority business enterprise program
1.10 Issuing Office –The Howard County Office of Purchasing
1.11 Contractor – Any entity that submits a response to this solicitation
1.12 Proposal – All information submitted by the Contractor in response to this solicitation
1.13 Purchase Order – The document by which the Contractor receives formal notification to perform work or deliver goods
1.14 Request for Proposal (RFP) – All documents identified in the Table of Contents, including any addenda
1.15 Solicitation – The Request for Proposal
1.16 User County – County department or office for which goods and/or services are being purchased

2 BID DEPOSIT:

2.1 When deemed necessary, a bid deposit may be required. This requirement is described in Section E of this solicitation. Such bid deposits shall be in the amount deemed adequate by the County. The deposit shall be a certified check, cashier's check, or treasurer's check drawn upon a solvent clearing house bank, or a bid bond issued by an insurance company licensed to do business in Maryland made payable to Director of Finance, Howard County, Maryland. A combination of certified check and bid bonds is not an acceptable response to the bid deposit requirement.

2.2 Bid deposits in the form of certified checks will be returned to the unsuccessful bidders upon the award of the Agreement(s), and to the successful bidder(s) upon execution of the Agreement(s) and the meeting of bond requirements, if applicable.

2.3 The successful bidder's failure to execute the Agreement or meet bond requirements within ten working days after the award shall result in the deposit being forfeited to the County as liquidated damages.

3 PERFORMANCE BOND: A performance bond for the full amount of the Agreement shall be required of the Contractor within ten days after award notification. The bond shall be issued by a surety company licensed to do business in Maryland.

4 RESERVATIONS:

4.1 The County Purchasing Agent or Designee reserves the right to reject any or all proposals or parts of proposals when, in the County Purchasing Agent's or Designee's reasoned judgment, the public interest will be served thereby.
4.2 The County Purchasing Agent or Designee, with the approval of the County Executive, may waive formalities or technicalities in proposals as the interest of the County may require.

4.3 The County Purchasing Agent or Designee reserves the right to increase or decrease the quantities to be purchased at the prices set forth in the proposal. The quantity intended to be purchased and the period and percentage amount of any such reservation will be stated in the solicitation.

4.4 The County Purchasing Agent or Designee reserves the right to award Agreements or place orders on a lump sum or individual item basis, or such combination as shall, in the County Purchasing Agent's or Designee's judgment, be in the best interest of the County.

4.5 The County Purchasing Agent or Designee may waive minor differences in specifications provided these differences do not violate the specification intent nor materially affect the operation for which the item or items are being purchased, nor increase estimated maintenance and repair cost to the County.

4.6 The County Purchasing Agent or Designee may reject any proposal which shows any omission, irregularity, alteration of forms, additions not called for, conditional or unconditional unresponsiveness, or proposals obviously unbalanced.

5 PERIOD OF VALIDITY: Unless otherwise specified, all formal proposals submitted shall be irrevocable for 120 days following the proposal opening date, unless the Contractor, upon request of the County Purchasing Agent or Designee, agrees to an extension. Bids may not be withdrawn during this period.

6 DELIVERY:

6.1 Contractors shall guarantee delivery of supplies in accordance with such delivery schedule as may be provided in the solicitation.

6.2 All items shall be delivered F.O.B. Destination, Inside Delivery, and delivery costs and charges included in the price offered, unless otherwise stated in the solicitation.

6.3 The County Purchasing Agent or Designee reserves the right to charge the Contractor for each day the supplies or services are not delivered in accordance with the delivery schedule. The per diem charge may be invoked at the discretion of the County Purchasing Agent or Designee and said sum to be taken as liquidated damages and deducted from the final payment, or charged back to the Contractor.

6.4 The County Purchasing Agent or Designee reserves the right to procure the supplies/services elsewhere on the open market if delivery is not made as specified, in which event, the extra cost of procuring the supplies/services may be charged against the Contractor and deducted from any monies due or which may become due.

7 GOVERNING LAW:

7.1 This Agreement shall be governed by and construed in accordance with the laws of the State of Maryland without regard to any choice of law principles that would dictate the laws of any other jurisdiction. The parties agree that the exclusive venue for any and all actions related hereto shall be the appropriate Federal or State court located within the State of Maryland.

7.2 The laws of Maryland and Howard County shall govern the resolution of any issue arising in connection with the contract, including, but not limited to, all questions on the validity of the contract, the capacity of the parties to enter therein, any modification or amendment thereto, and the rights and obligations of the parties hereunder.

8 PROTEST: Any protest concerning the award of an Agreement shall be decided by the County. Protests shall be made in writing to the Issuing Office and shall be filed within ten days of issuance of award notification. A protest is considered filed when received by the Issuing Office. The written protest shall include the name and address of the protestor, identification of the procurement, a statement of the specific reason for the protest and supporting exhibits. The Issuing Office will respond to the written protest within ten days. The County's decision is final.

9 DISPUTES: In cases of disputes as to whether or not an item or service quoted or delivered meets specifications, the decision of the County Purchasing Agent or Designee shall be final and binding on all parties. All other disputes arising under or related to the Agreement will be resolved, to the extent possible, by negotiation and settlement between the parties. Pending resolution, the Contractor shall proceed diligently with performance of the Agreement unless otherwise directed in writing.

10 AUTHORITY: Solicitations are issued pursuant and subject to the provisions of Article VIII, Howard County Charter; Sections 4.100 through 4.123, Howard County Code, 2003; and the rules and regulations as prescribed by the County.

11 FAIR LABOR STANDARDS ACT: All goods shipped against this order must be produced in compliance with the requirements of the Fair Labor Standards Act of 1938, as amended including Section 6, 7 and 12, and regulations and orders issued under Section 14 thereof.

12 CASH DISCOUNTS: If applicable, cash discounts will be taken into consideration in determining the award. However, an offer of a cash discount must allow a reasonable period of not less than 30 days in order to be included in evaluation of proposal pricing. A proposal offering a cash discount in a period of less than 30 days will be evaluated as a proposal without a cash discount offer. If the Contractor obtains an award by reason of their gross price, the County will hold the offer of a cash discount and make every effort to obtain such discount.

13 UNIT PRICES: Unless the Contractor clearly shows that it is the intent that a reduced total price is being offered on the basis of receiving an award of all items covered by the total, any totals should be the actual sum of the extension of unit prices. Otherwise, in the event of any discrepancy between a unit price(s), extended price(s), and/or total price(s), unit prices will govern and the bid will be refigured accordingly.

14 NON-WAIVER: Any waiver of any breach of covenants herein contained to be kept and performed by the Contractor shall not be deemed or considered as a continuing waiver and shall not operate to bar or prevent the County from declaring a forfeiture for any succeeding breach either of the same condition of covenant or otherwise.

15 PATENTS: If applicable, the Contractor shall defend any suit or proceeding brought against the County so far as based on a claim on any equipment, or on any part thereof, furnished under this Agreement which constitutes an infringement of any patent of the United States, if notified promptly in writing and given authority, information and assistance (at the Contractor's expense) for the defense of same, and the Contractor shall pay all damages and costs awarded therein against the County. In case said equipment or any part thereof, in such suit is held to constitute infringement and the use of said equipment or part if enjoined, the Contractor shall, at its own expense, either procure for the County the right to continue using said equipment or part, or replace same with non-infringing equipment or part, or modify so that it becomes non-infringing.

16 MARYLAND REGISTRATION: Contractors must be registered to do business in, and must be in good standing in, the State of Maryland. Contractors not registered must obtain registration information from the Maryland Department of Assessments and Taxation website at: www.dat.state.md.us/ or by calling 410-767-1184 or Toll Free 888-246-5941.

17 AVAILABILITY OF FUNDS: The contractual obligation of the County under this Agreement is contingent upon the availability of appropriated funds from which payment for this Agreement can be made.

18 INTEGRATION AND MODIFICATION: This solicitation, the Contractor's response to this solicitation, subsequent Purchase Order(s), and, if applicable, the legal Agreement represents the entire understanding between the parties. Any additions or modifications shall only be made in writing and executed by both parties.

19 NON-ASSIGNMENT OF AGREEMENT: Neither the County nor the Contractor shall assign, sublet or transfer its interest or obligations under the resulting Agreement to any third party, without the written consent of the other. Nothing herein shall be construed to create any personal or individual liability upon

any employee, officer or elected official of the County, nor shall the resulting Agreement be construed to create any rights hereunder in any person or entity other than the parties to this Agreement.

20 AGREEMENT:

20.1 The County and Contractor must execute an Agreement resulting from the award of this solicitation. This process typically takes approximately three weeks from the date the successful Contractor is identified. In order to expedite this process, a sample standard Agreement is attached for review as part of this solicitation. Exceptions, if any, to the County's standard Agreement (Exhibit I) must be noted in the proposal to be considered during evaluation. Exceptions to the County's standard Agreement may result in rejection of the proposal.

20.2 Do not fill in or sign the sample Agreement attached as Exhibit I. The County will prepare an Agreement specific to this solicitation for execution by the successful Contractor.

21 PUBLIC INFORMATION/PROPRIETARY/CONFIDENTIAL INFORMATION:

21.1 The County operates under a public information law, which permits access to most records and documents.

21.2 Proposals will be available for public inspection after the award announcement, except to the extent that a Contractor designates trade secrets or other proprietary data to be confidential. Material designated as confidential must be readily separable from the remainder of the proposal to facilitate public inspection of the non-confidential portion of the proposal. A Contractor's designation of material as confidential will not necessarily be conclusive, and the Contractor may be required to provide justification why such material should not be disclosed, on request, under the Maryland Access to Public Records Act, State Government Article, Sections 10-611 through 10-628, of the Annotated Code of Maryland.

22 COOPERATIVE PURCHASE:

22.1 The County reserves the right to extend all of the terms, conditions, specifications, and unit or other prices of any Agreement resulting from this solicitation to any and all public bodies, subdivisions, schools districts, community colleges, colleges, and universities including non-public schools. This is conditioned upon mutual agreement of all parties pursuant to special requirements, which may be appended thereto. The Contractor agrees to notify the issuing body of those entities that wish to use any Agreement resulting from this solicitation and will also provide usage information, which may be requested.

22.2 The County assumes no authority, liability or obligation, on behalf of any other public or non-public entity that may use any Agreement resulting from this solicitation. All purchases and payment transactions will be made directly between the Contractor and the requesting entity. Any exceptions to this requirement must be specifically noted in the bid response.

23 AWARD NOTIFICATION:

23.1 Award notification will be by U.S. Mail, e-mail or fax or a combination thereof.

23.2 The awarded Contractor(s) will be required to return a Insurance Certificate naming. "Howard County, Maryland, its officials, employees, agents and volunteers" as Certificate Holder and as Additional Insured, the executed Agreement* the completed EBO Schedule of Participation and the Maryland Registration Certificate of Good Standing.

*** As Contractors have had an opportunity to note Exceptions to the Agreement with their proposal submission, it is anticipated that execution of the Agreement will require minimal time. PLEASE BE SURE TO READ THE SAMPLE AGREEMENT, EXHIBIT I. PRIOR TO SUBMISSION OF YOUR PROPOSAL.**

24 TERMINATION:

24.1 Termination for Convenience: The County may terminate this contract, in whole or in part, if the County determines that such termination is in the best interest of the County, without showing cause, upon giving at least 30 days written notice to the Contractor. The County shall pay all reasonable costs incurred by the Contractor up to the date of termination. However, in no event shall the Contractor be paid an amount which exceeds the price bid for the work performed. The Contractor shall not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

24.2 Termination for Default: When the Contractor has not performed or has unsatisfactorily performed one or more material terms of the contract, the County may terminate the Purchase Order for default. Upon termination for default, payment may be withheld at the discretion of the County. Failure on the part of the Contractor to fulfill the contractual obligations shall be considered just cause for termination of the contract. If the damages exceed the undisbursed sums available for compensation, the County shall not be obligated to make any further disbursements hereunder. The Contractor will be paid for work satisfactorily performed prior to termination less any excess costs incurred by the County in reprocuring and completing the work.

SECTION D

SPECIFICATIONS

1 BACKGROUND: The Howard County Electric Bus Project represents an evolution of the Central Maryland Regional Transit Corporation (CMRT) Electric Bus Project that was selected by the Federal Transit Administration as part of the Fiscal 2010 Transit Investments for Greenhouse Gas and Energy Reduction II (TIGGER) program. This is a grant funded project through the Maryland Transit Administration (MTA).

2 STATEMENT OF WORK: Howard County, Maryland, (the "County"), seeks a qualified supplier, (the "Contractor"), to furnish an all-electric transit solution to service a designated route within the County service area. The County requires three heavy-duty battery electric transit buses, which may be used for general service on urban arterial streets. Buses shall have a minimum expected life of twelve (12) years or 500,000 miles, whichever comes first, and are intended for the widest possible spectrum of passengers, including children, adults, the elderly and people with disabilities. The County's requirement shall include three all-electric 35-foot heavy-duty transit buses, delivery and installation of supporting charging infrastructure in accordance with the terms and conditions as set forth. The Contractor shall keep the County informed of technological advancements, which the County may take advantage of during the contract period. This specification is customized for a unique zero-emission, all-electric transit service at Howard County Transit. This specification defines requirements for battery electric bus fleet and supporting charging equipment, which may include multiple on route charging stations and/or depot charging stations for overnight charging. The conceptual intent is that the "charging" infrastructure be "open" and capable of supporting buses of varying type / model, such that the system of buses and chargers would be scalable for future growth without proprietary constraint. This procurement is 100% federally funded.

2.1 The County is requesting a solution that includes the following vehicles, equipment and services:

2.1.1 A minimum base quantity of three (3) 35-foot all-electric transit buses. The buses shall be designed for heavy-duty transit service and must have a minimum FTA-service life of twelve (12) years. The buses must be able to be charged from the on route fast charge inductive charger specified herein;

2.1.2 Charging equipment to support the above vehicles which includes one (1) on route inductive charging station that enables the charging of buses in less than ten minutes while exchanging passengers at a designated stop and depot-based plug in charging equipment to support overnight charging of vehicles;

2.1.3 Installation and testing of all charging equipment. Installation shall include setting and securing the stationary equipment as well as making all necessary utility connections. County or its partners will provide site design, preparation (including utility stub-outs) and restoration services. The contractor must provide close coordination for proper accomplishment of these activities;

2.1.4 Operator training and manuals for the operation of transit buses and charging equipment;

2.1.5 Maintenance plan, training and manuals for the maintenance of buses and charging equipment;

2.1.6 Dedicated, on-site maintenance support for the transit buses and charging equipment for the first year of operation;

2.1.7 Options for maintenance support for the complete inductive charging system for years 2 and 3 of operation;

2.1.8 Option for provision and installation of one (1) additional inductive charging station located on the route.

2.1.9 Also, at a high conceptual level due to the inherent sensitivities of all electric vehicle performance relative to mass and energy efficiency, particular considerations shall be given to vehicle weight, component weight, parasitic loads, power management, thermal/solar loads, etc.

2.2 **Legal Requirements**:

2.2.1 The Contractor shall comply with all applicable federal, state and local regulations. These shall include but not be limited to ADA, as well as state and local accessibility, safety and security requirements. Local regulations are defined as those below the state level.

2.2.2 Buses shall meet all applicable FMVSS and shall accommodate all applicable FMCSR regulations in effect at location of the County and the date of manufacture.

2.2.3 In the event of any conflict between the requirements of these specifications and any applicable legal requirement, the legal requirement shall prevail. Technical requirements that exceed the legal requirements are not considered to conflict.

2.3 **Overall Requirements**: All three of the buses must be similar in design and manufacture. The Contractor shall not make any substantive or material changes that would differentiate one bus from another bus. If the Contractor identifies a change during the manufacturing process that would materially improve the design, safety and/or performance of the bus, this change must (1) be discussed with the County and (2) be considered as a retrofit (if possible) to any previous bus(es) manufactured or assembled. Any such changes must be approved by the County in accordance with the communication requirements of this solicitation. The Contractor shall ensure that the application and installation of major bus subcomponents and systems are compliant with all such subcomponent vendors' requirements and recommendations. Contractor shall identify subcomponent vendors that shall submit installation/application approval documents with the completion of the lead bus. Components, parts and sub-systems used in the vehicle shall be of heavy- duty transit design and proven in transit service or based on a service proven design. The loss of power to the bus shall not cause the driver to lose control of the bus or to lose steering or braking. The bus shall be able to be safely brought to a controlled stop.

2.4 **Weight**: It shall be a design goal to construct each bus as light in weight as possible without degradation of safety, appearance, comfort, traction or performance. Buses at a capacity load shall not exceed the tire factor limits, brake test criteria or structural design criteria.

2.5 **Capacity**: The vehicle shall be designed to carry the gross vehicle weight, which shall not exceed the bus GVWR.

2.6 **Service Life**: The minimum useful design life of the bus in transit service shall be at least twelve (12) years or 500,000 miles. It shall be capable of operating at least 40,000 miles per year, including the 12th year. The minimum useful life of the charging infrastructure components shall be at least twelve (12) years and 3,285 MWh. The basis for the stated service life shall also be presented.

2.7 **Maintenance and Inspection**:

2.7.1 Scheduled maintenance tasks for buses and charging equipment shall be related and shall be, in accordance with the manufacturer's recommended preventative maintenance schedule (along with routine daily service performed during the servicing and overnight charging operations). The overall PMI schedule for buses shall be based

upon a minimum of a 6,000 mile interval and/or multiples of same.

2.7.2 The manufacturer is responsible for providing a written comprehensive 52-week and long term rehab/replacement maintenance plan encompassing coaches and charging infrastructure for its entire useful life.

2.7.3 Test ports, as required, shall be provided for commonly checked functions on the bus, such as, hydraulic, pneumatic, cooling, temperature, voltage, current and state of charge (SOC).

2.7.4 The Contractor shall give prime consideration to the routine problems of maintaining the vehicle and charging equipment. All vehicle and charging station components and systems, both mechanical and electrical, which will require periodic physical work or inspection processes, shall be installed so that a minimum of time is consumed in gaining access to the critical repair areas. It shall not be necessary to disassemble portions of the coach structure and/or equipment such as seats and flooring under seats in order to gain access to these areas. Each coach shall be designed to facilitate the disassembly, reassembly, servicing or maintenance, using tools and equipment that are normally available as standard commercial items.

2.7.5 Requirements for the use of unique specialized tools will be minimized. The body and structure of the coach and charging equipment shall be designed for ease of maintenance and repair. Individual panels or other equipment which may be damaged in normal service shall be repairable or replaceable. Ease of repair shall be related to the vulnerability of the item to damage in service. Tools such as compartment door keys, bellows gauges and other tools that are required for daily maintenance and inspections shall be furnished for each coach.

2.8 **Interchangeability**: Unless otherwise agreed, all units and components procured under this Contract, whether provided by Suppliers or manufactured by the Contractor, shall be duplicates in design, manufacture and installation to ensure interchangeability among buses in each order group in this procurement. This interchangeability shall extend to the individual components as well as to their locations in the buses. These components shall include, but are not limited to, passenger window hardware, interior trim, lamps, lamp lenses and seat assemblies. Components with non-identical functions shall not be, or appear to be, interchangeable.

2.8.1 Any one component or unit used in the construction of these buses shall be an exact duplicate in design, manufacture and assembly for each bus in each order group in this Contract. Contractor shall identify and secure approval for any changes in components or unit construction provided within a Contract.

2.8.2 In the event that the Contractor is unable to comply with the interchangeability requirement, the Contractor must notify the County and obtain the County's prior written approval, including any changes in pricing.

2.8.3 The County shall review proposed product changes on a case-by-case basis and shall have the right to require extended warranties to ensure that product changes perform as least as well as the originally supplied products.

2.9 **Training**: The Contractor shall offer a training package as a deliverable within the scope of the bus/charging equipment proposal and include the necessary skills level classes such that the County operators and mechanics are able to operate, diagnose, repair and maintain all equipment provided within this specification. The Contractor shall describe the detail of the proposed training deliverable within their bid submittal, to include, subject matter, sample curriculum and approximation of training hours required. The County reserves the right to review, make recommendations and approve the actual deliverable prior to its use for training County personnel. The Contractor shall assume the following as minimum requirements:

Table 1
Training Requirements

Subject	Minimum Number of classes	Minimum Hours per class
Operator Familiarization	4	4
Mechanic Familiarization	2	4
Facility Maintenance Technician, Charging Equipment	2	8
PMI Inspection	2	8
Propulsion, Energy Storage and Control System	2	8
Basic Chassis, Steering, Brakes, Suspension	2	8
HVAC	2	4
Low Voltage Systems, Multiplex and Basic Vehicle Control Systems	2	4
Control Systems Software, Programming, Data Collection, and Analysis	2	8
Bank of Non-Specific Training*	TBD	200

2.10 **Technical/Service Representatives**: The Contractor shall, at its own expense, have one or more competent technical service representatives available on request to assist the County in the solution of engineering or design problems within the scope of the specifications that may arise during the warranty period. This does not relieve the Contractor of responsibilities under the provisions of "Section 7: Warranty Requirements."

2.11 **Operating Environment**: The bus shall achieve normal operation in ambient temperature ranges of 10 ºF to 115 ºF, at relative humidity between 5 percent and 100 percent, and at altitudes up to 3000 feet above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below 10 °F, above 115°F or at altitudes above 3000 feet. Altitude requirements above 3000 feet will need separate discussions with the engine manufacturer to ensure that performance requirements are not compromised. Speed, gradeability and acceleration performance requirements shall be met at, or corrected to, 77 °F, 29.31 in. Hg, dry air per SAE J1995.

2.12 **Noise**:

2.12.1 **Interior Noise**: The combination of inner and outer panels and any material used between them shall provide sufficient sound insulation so that a sound source with a level of 80 dBA measured at the outside skin of the bus shall have a sound level of 65 dBA or less at any point inside the bus. These conditions shall prevail with all openings, including doors and windows, closed and with the engine and accessories switched off. The bus-generated noise level experienced by a passenger at any seat location in the bus shall not exceed 72 dBA. The driver area shall not experience a noise level of more than 70 dBA.

2.12.2 **Exterior Noise**: Airborne noise generated by the bus and measured from either side shall not exceed 70 dBA under full power acceleration when operated 0 to 35 mph at curb weight. The maximum noise level generated by the bus pulling away from a stop at full power shall not exceed 72 dBA. The bus-generated noise at curb idle shall not exceed 65 dBA. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured. The Contractor shall comply with the exterior noise requirements defined in local laws and ordinances identified by the County and SAE J366.

2.13 **Fire Safety**: The bus and charging equipment shall be designed and manufactured in accordance with all applicable fire safety and smoke emission regulations. These provisions shall include the use of fire-retardant/low- smoke materials, fire detection systems, bulkheads and facilitation of passenger evacuation.

2.13.1 The buses shall be equipped with a suitable means of automatically detecting and extinguishing fires and/or over temperature situations that may cause unreliable or unsafe operation. If the energy storage system is capable of releasing combustible gas, then this same system shall incorporate an integrated gas detection and alarm feature. This system shall employ intrinsically safe detectors capable of reliable operation, alert and shutdown to insure safe operation, alert and shutdown shall respectively occur at approximately 25 and 50% LFL. This system shall include a UPS capable of sustaining operation for a period of at least 72 hours regardless of the primary energy source SOC and remain uninterrupted regardless of "run" / "ign" position. The system controller shall include a means of data logging and storage such that incident data is recoverable and periodic system health checks. The quantity, location and technology for sensors, suppression, agents, etc. shall be best practice for the intended application and environment. The bus shall be equipped with an Amerex ABC dry chemical pre-engineered fire suppression system, model SafetyNet V-25 with a minimum of four nozzles, or approved equal.

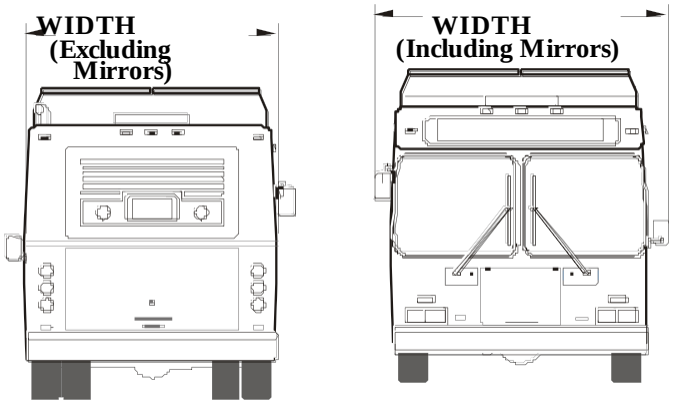
2.13.2 All materials used in the construction of the passenger compartment of the bus shall be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993. Materials entirely enclosed from the passenger compartment, such as insulation within the sidewalls and sub-floor, need not comply. In addition, smaller components and items, such as seat grab rails, switch knobs and small light lenses, shall be exempt from this requirement.

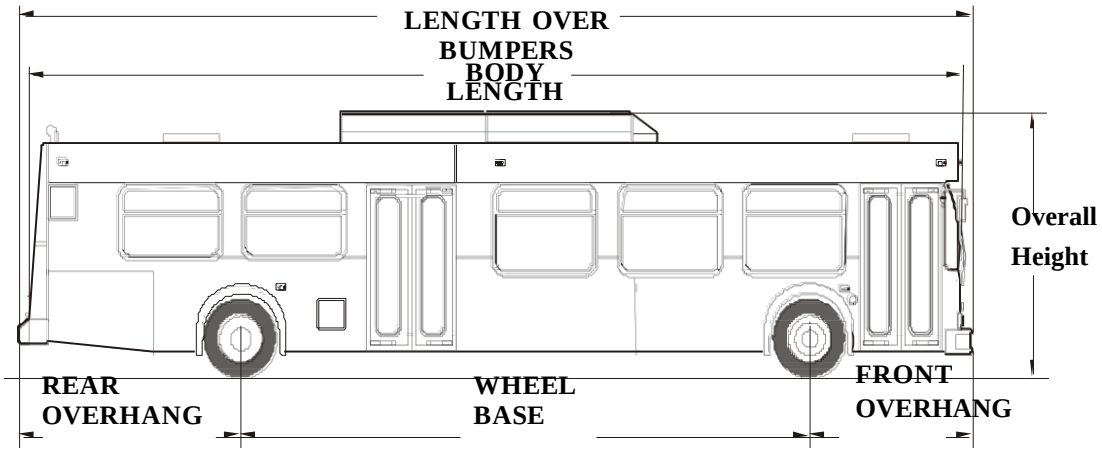
2.14 **Respect for the Environment**: In the design and manufacture of the bus, the Contractor shall make every effort to reduce the amount of potentially hazardous waste. In accordance with Section 6002 of the Resource Conservation and Recovery Act, the Contractor shall use, whenever possible and allowed by the specifications, recycled materials in the manufacture of the bus and charging equipment. The Contractor shall provide a plan for recycling of replaced battery cells and/or battery packs both during and after the warranty period.

2.15 **Dimensions**:

2.15.1 **Physical Size**: With exceptions such as exterior mirrors, marker and signal lights, bumpers, fender skirts, washers, wipers, ad frames, cameras, object detection systems, bicycle racks, feelers and rub rails, the bus shall have the following overall dimensions as shown in Figure 1 at static conditions and design height.

FIGURE 1
Transit Bus Exterior Dimensions





2.15.2 **Bus Length**: For ease of use, the following tolerances will be allowable for each given bus length. Bus length is determined as the measurement from bumper to bumper. The preferred length is 35 feet, +1', -3'. The County will consider an alternative 40 foot length but the preference is a 35 foot length.

2.15.3 **Bus Width**: Body width shall be 102 in. (+0, -1 in.).

2.15.4 **Bus Height**: Maximum overall height shall be 140 in., including all rigid, roof-mounted items such as A/C, energy storage system, charging interface, covers, etc.

2.15.5 **Step Height**: The step height shall not exceed 16.0 in. at either doorway without kneeling and shall not exceed 15.0 in. at the step. A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

2.15.6 **Underbody Clearance**: The bus shall maintain the minimum clearance dimensions as shown in Figure 2 and defined in SAE Standard J689, regardless of load up to the gross vehicle weight rating.

2.15.7 **Ramp Clearances**:

2.15.7.1 The approach angle is the angle measured between a line tangent to the front tire static loaded radius arc and the initial point of structural interference forward of the front tire to the ground.

2.15.7.2 The departure angle is the angle measured between a line tangent to the rear tire static loaded radius arc and the initial point of structural interference rearward of the rear tire to the ground.

2.15.7.3 The breakover angle is the angle measured between two lines tangent to the front and rear tire static loaded radius and intersecting at a point on the underside of the vehicle that defines the largest ramp over which the vehicle can roll (reference Table 2).

TABLE 2
Breakover Angle

Angle	35-ft Bus
Approach	8.6 degrees (min.)
Front breakover	8 degrees (min.)
Departure	8.7 degrees (min.)

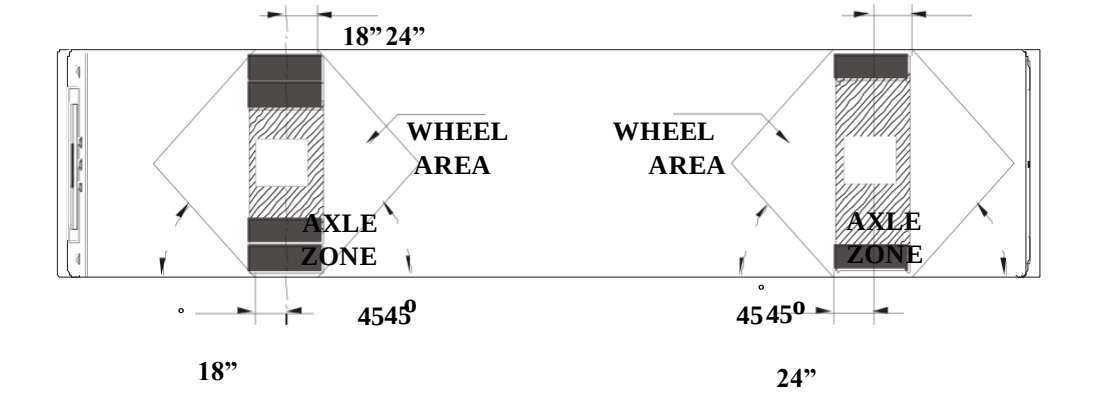
2.15.8 **Ground Clearance**:

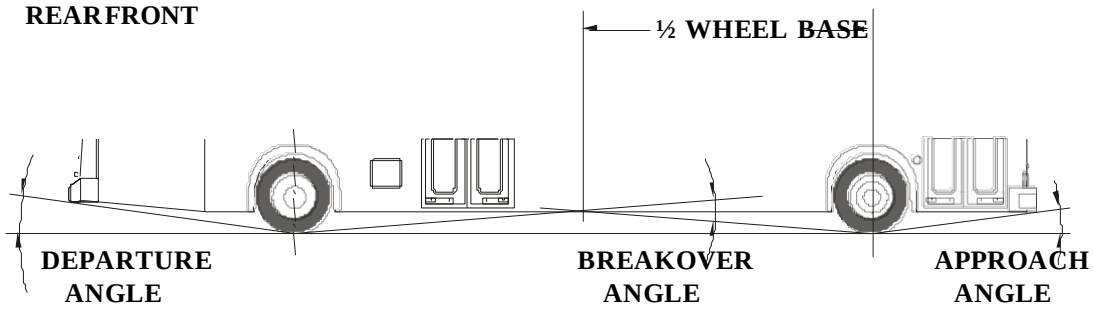
2.15.8.1 Ground clearance shall be no less than 9 in., (8 in. at jacking pad) except within the axle zone and wheel area.

2.15.8.2 Axle zone clearance, which is the projected area between tires and wheels on the same axial centerline, shall be no less than 5.4 in.

2.15.8.3 Wheel area clearance shall be no less than 8 in. for parts fixed to the bus body and 6 in. for parts that move vertically with the axles.

FIGURE 2
Transit Bus Minimum Road Clearance





2.15.9 **Floor Height**: Height of the step above the street shall be no more than 16 in. measured at the centerline of the front and rear doorway. The floor may be inclined along the longitudinal axis of the bus, and the incline shall not exceed 3.5 degrees off the horizontal except locally at the doors where 2 degree slope toward the door is allowed. All floor measurements shall be with the bus at the design running height and on a level surface and with the standard installed tires. A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

2.15.10 **Interior Headroom**: Headroom above the aisle and at the centerline of the aisle seats shall be no less than 78 in. in the forward half of the bus tapering to no less than 74 in. forward of the rear settee. At the centerline of the window seats, headroom shall be no lower than 61 in., except for parcel racks and reading lights, if specified. Headroom at the back of the rear bench seat may be reduced to a minimum of 50 in., but it shall increase to the ceiling height at the front of the seat cushion. In any area of the bus directly over the head of a seated passenger and positioned where a passenger entering or leaving the seat is prone to strike his or her head, padding shall be provided on the overhead paneling.

2.15.11 **Aisle Width**: The minimum clear aisle width between pairs of transverse seats with all attached hardware shall be at least 22 inches. The aisle width between the front wheelhouses shall be at least 35 in., and the entire area between the front wheelhouses shall be available for passengers and mobility aid devices.

2.16 **Vehicle Performance**:

2.16.1 **Power Requirements**: The propulsion system shall be sized to provide sufficient power to enable the bus to meet the defined acceleration, top speed, route, mileage, GVWR and gradeability requirements at Minimum State of Charge, and operate all propulsion- driven accessories using actual road test results and computerized vehicle performance data.

2.16.2 **Top Speed**: The bus shall be capable of achieving a top speed of 55 mph on a straight, level road at GVWR with all accessories operating. The bus shall be capable of safely maintaining the vehicle speed according to the recommendations by the tire manufacturer. Values are assumed to be sustained. Manufacturer shall supply County with data if there is a variance between peak performance and sustained vehicle performance.

2.16.3 **Gradeability**: Gradeability requirements shall be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating. The propulsion system and drivetrain shall enable the bus 1) to achieve (from stop position) and maintain a speed of 40 mph on a 2 1⁄2 percent ascending grade and 2) to achieve (from stop position) and maintain a speed of 15 mph on a 10 percent ascending grade over a distance of 2/10 of a mile.

2.16.4 **Acceleration**:

2.16.4.1 The acceleration shall meet the requirements below and shall be sufficiently gradual and smooth to prevent throwing standing passengers off-balance. Acceleration measurement shall commence when the accelerator is depressed.

TABLE 3
Maximum Start Acceleration Times on a Level Surface at GVWR

Speed (mph)	Maximum time (s)
10	5
20	10
30	18
40	30
50	60

2.16.4.2 The propulsion and braking systems shall meet the performance requirements of the Duty Cycle.

2.16.4.3 Braking application and performance shall remain consistent regardless of system State of Charge (SOC) or other variances related to regenerative braking.

2.16.4.4 The system shall be programmable to allow optimization of acceleration and deceleration. Performance may be affected when reprogramming. The manufacturer shall supply the new performance data.

2.16.5 **Operating Range**: The operating range of the coach shall be designed to meet the operating profile as stated in the "Design Operating Profile" section. The operating range of the coach, on the prescribed Design Operating Profile under full GVWR and auxiliary loads, shall be a minimum of 25 miles without charging, starting at 90% SOC and ending at no less than 20% SOC. The preferred operating range is 35 miles without charging, under full GVWR and auxiliary loads, starting at 90% SOC and ending at no less than 20% SOC.

2.17 **Fuel Economy (Design Operating Profile)**:

2.17.1 **Altoona Fuel Economy Tests**: Test results from the Altoona fuel economy tests or other applicable test procedures shall be provided to the County. Results shall include vehicle configuration and test environment information. Fuel economy data shall be provided for each design operating profile. The design operating profile is assumed to be defined by the Bus Research Testing Center at Altoona, Pennsylvania ("Altoona") fuel duty cycle. Altoona fuel economy tests shall be run on the following four duty cycles using maximum auxiliary loads and GVWR. Results shall be reported in kWh per mile.

2.17.1.1 Central Business District (CBD)
2.17.1.2 Arterial (ART)
2.17.1.3 Commuter (COM)
2.17.1.4 Idle

2.18 **County Design Operating Profile**:

2.18.1 At a minimum, the coach must have a design operating profile that meets the requirements of the route model presented in Exhibits 1 through 6 below, including

speed, elevation, and grade. It is assumed that buses will start daily duty cycle at Maximum SOC. Batteries shall not be depleted below Minimum SOC during normal operations. Charging of the batteries shall not exceed Maximum SOC at any time during charging.

2.18.2 The route model data provided may be used as an approximation of the actual route for modeling purposes only. The data was collected with a GPS data logger, filtered, and augmented with elevation data from the U.S. Geological Survey and NASA to determine grades. If selected and in the event that a new propulsion system is to be developed for this procurement, the Contractor shall use the County Design Operating Profile for the required bench test of the proposed propulsion system.

2.18.3 The Contractor shall identify and propose the operational strategy, including notional bus blocking scenario, on-route charge time, and total time on-route, to optimally meet the existing Green Route service demands shown in Exhibit 6 with a minimum of 2 proposed buses and a maximum of 3 proposed buses. Preference will be given to proposals that require the minimum number of resources (buses, deadhead trips, dwell time to charge, etc.) to meet the Design Operating Profile.

EXHIBIT 1
Minimum Operating Profile
Data Summary

Maximum Speed	38 MPH
Maximum Grade	12%
Route Distance	10 miles
Route Duration	1 hour
Distance from Depot to Start of Route	8 Miles

EXHIBIT 2
Green Route and Inductive Charging Station Location

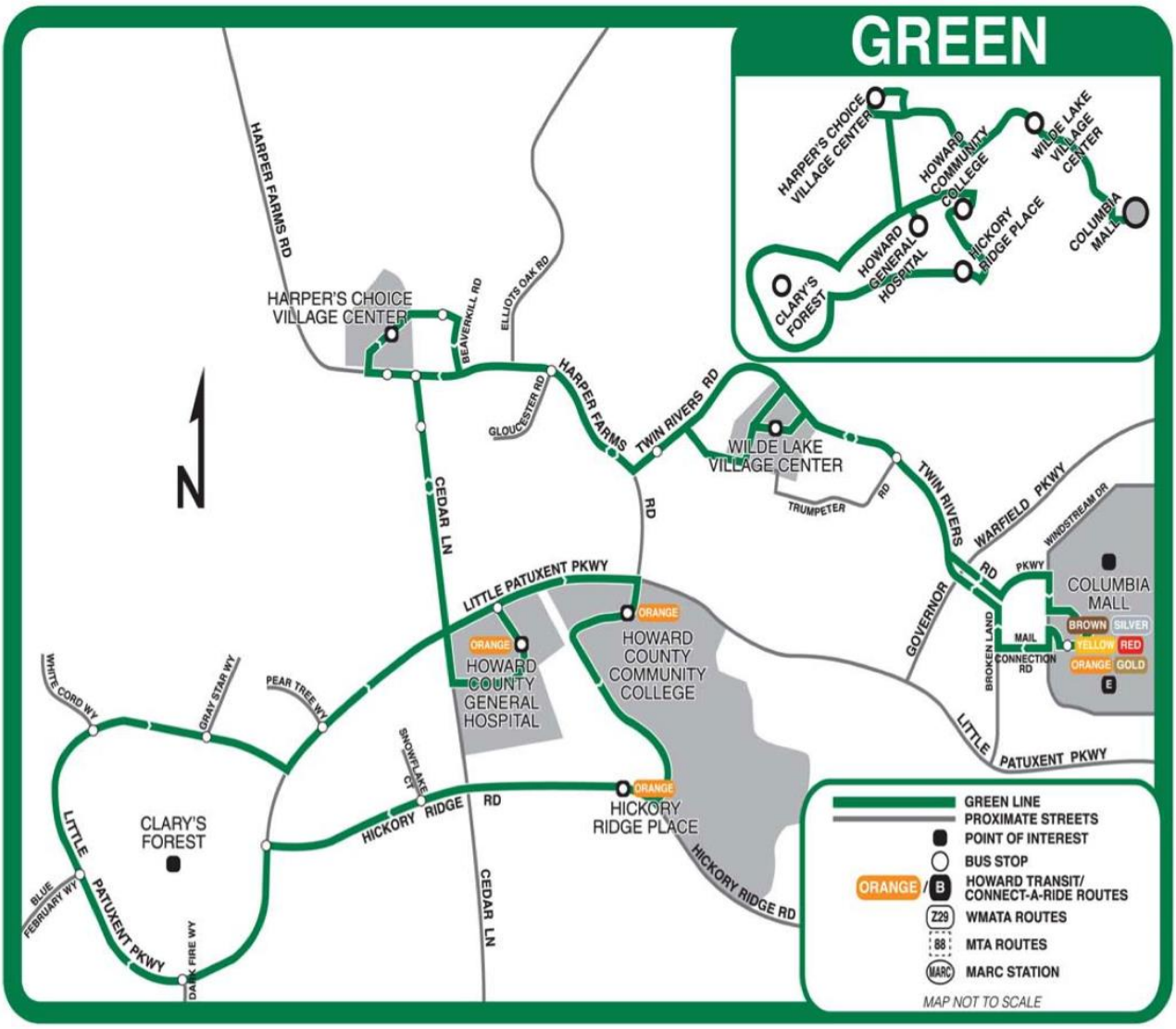


EXHIBIT 3
Aerial View of Route

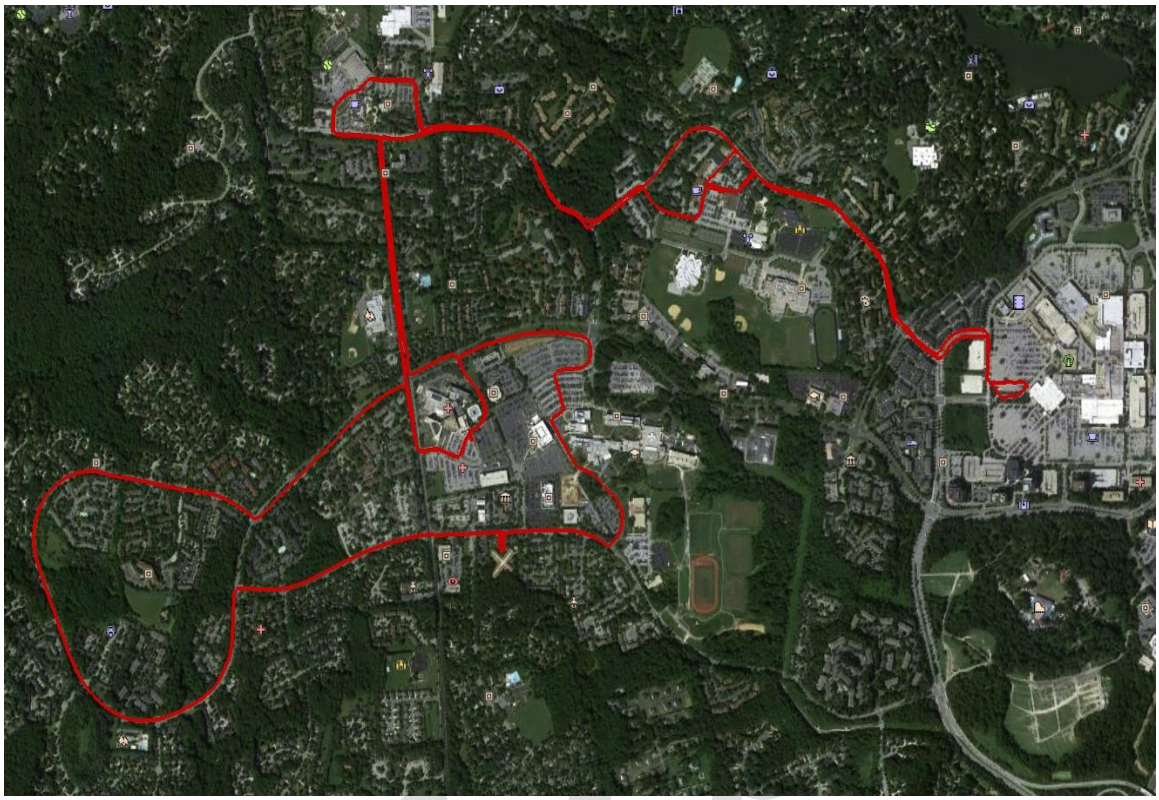


EXHIBIT 4
Route Speed Breakdown

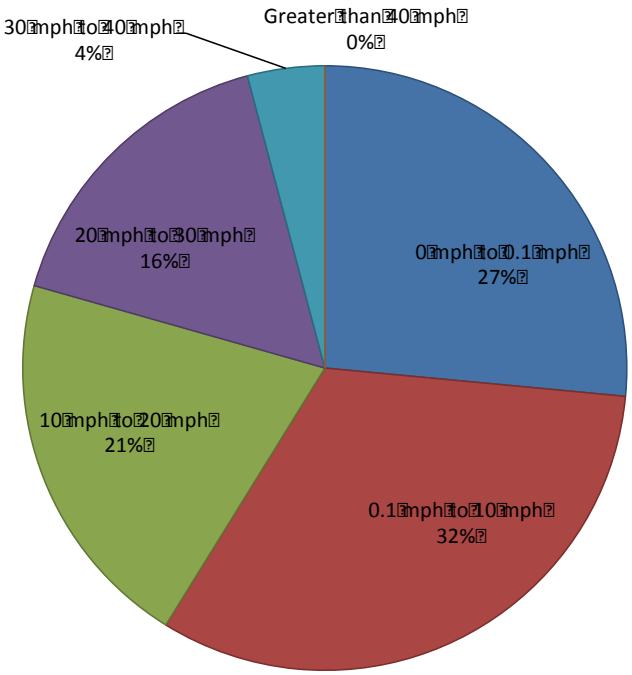


EXHIBIT 5
Route Grade Breakdown

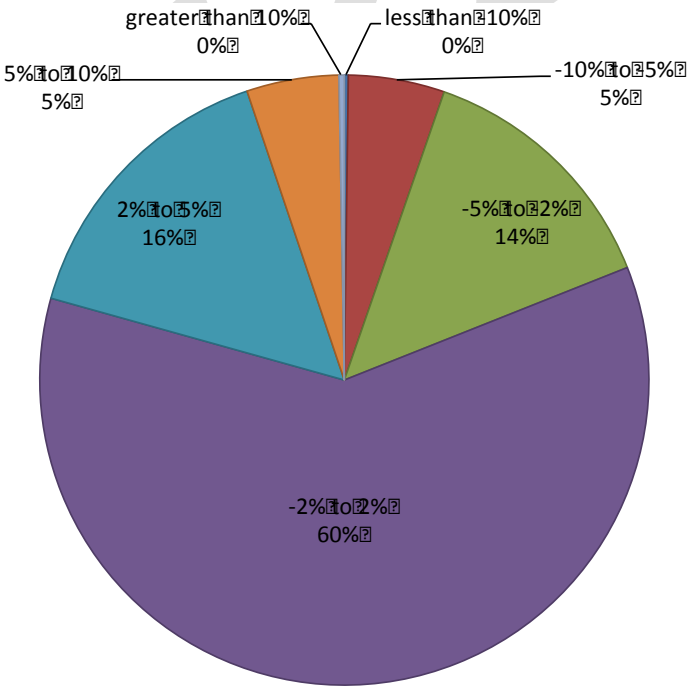


EXHIBIT 6

Speed and Elevation Profiles

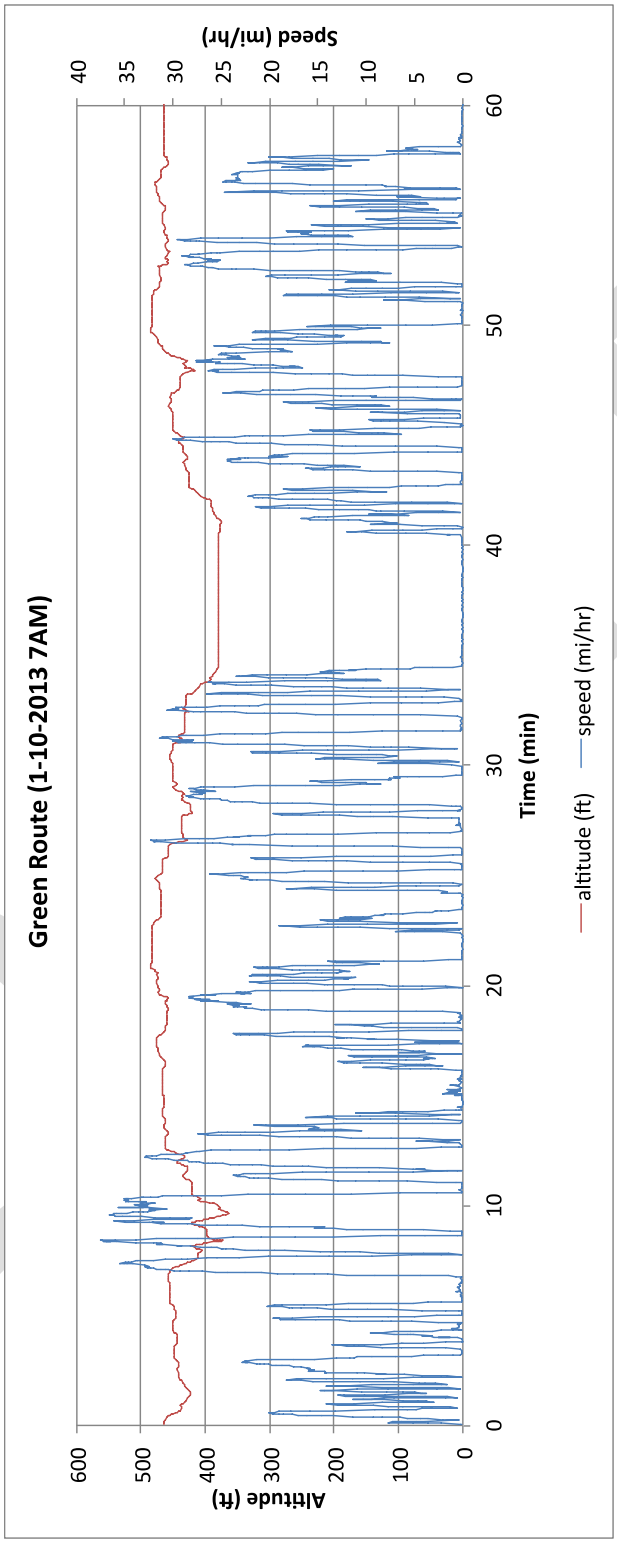
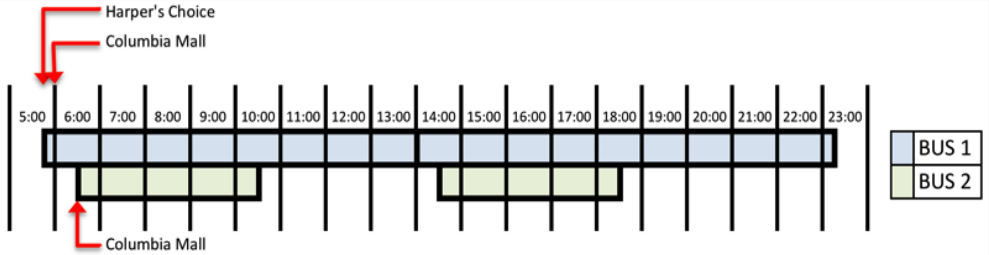


EXHIBIT 7

Existing and Proposed Bus Blocking Schedule/Daily Service Requirements

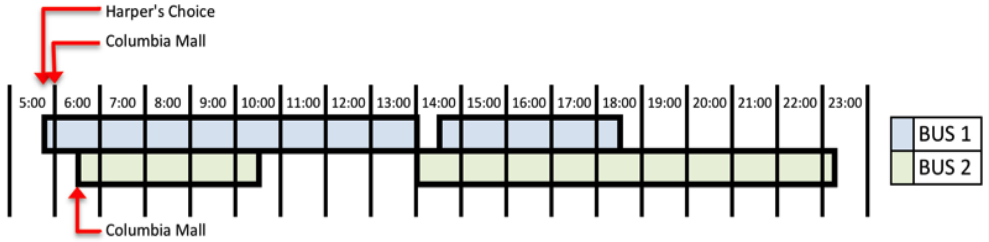
CURRENT BUS SCHEDULE

Bus	Pull Out	Start Route	End Route	Pull In	Hours	# Loops	Miles
Green 1	5:13	5:40	23:10	23:39	18:26	17.50	170.80
Green 2	6:00 / 14:00	6:30 / 14:30	10:30 / 18:30	10:50 / 18:50	9:40	8.00	78.08



PROPOSED BUS SCHEDULE

					Operating		
Bus	Pull Out	Start Route	End Route	Pull In	Hours	# Loops	Miles
Green 1	5:13	5:40 / 14:30	14:00 / 18:30	18:50	13:07	11	126
Green 2	6:00	6:30 / 14:00	10:30 / 23:10	23:39	14:09	13	146



2.19 **Powerplant**:

2.19.1 **Propulsion System (Electric)**: The bus shall be powered by a battery electric propulsion system. Function and operation of the bus shall be transparent to the Bus Operator and passengers. The OEM shall assure that the bus structure can successfully accept the installation of the propulsion system and be operated on the stated duty-cycle for a period of 12 years without a structural failure. At a minimum, the propulsion system shall comply with applicable local, state, and/or federal emissions and useful life requirements, as a zero-emissions bus. The propulsion system shall comply with local, state, and federal (maintenance) and other applicable sections. The Electric Drive System shall be rated for the GVWR or greater of the bus.

2.19.2 **Propulsion System Service**: The propulsion system shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the propulsion system or any subsystems. However, the County shall recognize that properly rated test equipment and safe electrical work practices are essential when servicing high voltage components. Contractor shall provide all specialty tools and diagnostic equipment required for maintaining the Propulsion System in accordance with Special Tools List.

2.19.3 **Traction Motor**: The traction system shall include a motor or motors sufficient to provide the necessary torque to meet the gradeability, startability, and acceleration specifications. The traction motor(s) shall be air-cooled if possible. The cooling shall be ample to provide normal operation of the bus in standard stop-and-go shuttle operation under all climatic conditions encountered in Howard County, MD. The motor(s) shall have thermal warning to prevent damage in the event there is an over temperature situation. The manufacturer shall comply with all subcomponent vendor's requirements and recommendations regarding motor design, sizing, and method of cooling or loading specifications. The inverter/motor combination shall be designed to operate for not less than 200,000 miles in the anticipated duty cycle without major failure or significant deterioration. Adequate provision for lubrication, cooling, and monitoring of these functions is required. The motor(s) shall be mounted on resilient mounts to provide for maximum isolation of noise and vibration.

2.19.4 **Propulsion System Controller (PSC)**: The PSC regulates energy flow throughout system components in order to provide motive performance and accessory loads, as applicable, while maintaining critical system parameters (e.g., voltages, currents, temperatures, etc.) within specified operating ranges. The controller shall monitor and process inputs and execute outputs as appropriate to control the operation of all propulsion system components. The PSC shall be equipped with an electronically controlled management system, compatible with multiplex wiring systems and either 12- or 24-volt electrical systems. The overall propulsion system and PSC shall include and manage support systems such as, steering, air, HVAC, defroster, etc.

2.19.4.1 The propulsion system shall be managed by the PSC. This PSC is assumed to be the hub for all propulsion system device to device communication, to include traction motors, energy storage, charging equipment and power switching electronics, and interface to other vehicle systems via SAE Standards (J1708, J1939, etc.). The PSC shall provide the following functionality:

2.19.4.1.1 Storage of the application file necessary to execute propulsion system commands

2.19.4.1.2 Storage of the buses data file generated on a day to day basis, to include:

2.19.4.1.2.1 At a minimum, duty cycle information (time stamp, vehicle speed, elevation, location, ambient temperature), voltage and current (traction motor, auxiliary system, ESS, power electronics, onboard charging system, etc.) at 1 sec intervals

2.19.4.1.2.2 History of charging sessions, energy in, time stamp, SOC, etc.

2.19.4.1.2.3 Incidents and alarms

2.19.4.1.2.4 Health monitoring and diagnostics information

2.19.4.2 If the proposed PSC does not have the capability of performing advanced data logging and storage, an in-house telematics system may be used so long as all specified PSC functionality is maintained and all data described in TS 84.3 Bus Level System can be obtained by the County within one week of such request.

2.19.4.3 Expert level software such that bus efficiency is optimized per duty cycle on the fly, i.e. "adaptive learning" to consider, route, time of day, etc. The objective is to maintain the buses level of expected performance, meanwhile minimize the cost of the electric utility used for charging. If the proposed PSC controller does not have the capability to perform "adaptive learning", the Contractor must perform parameter tuning to help optimize the efficiency of the vehicle to the given route.

2.19.4.4 A means of executing "limp home" instruction such that the bus is able to return to the depot without charge assistance, i.e. ability to miss several in route charging sessions, non-essential load shedding, etc.

2.19.4.5 A wireless means of communication to the on route fast chargers, at depot slow charger and/or if probed via a WLAN in close proximity.

2.19.4.6 The system is assumed to include current / power sensors at strategic locations throughout the propulsion system components such that real time comparisons can be made between anticipated power flow and actual power. This feature shall facilitate health checking of components to indicate, "open", "shorted" and/or components that have considerable variance.

2.19.4.7 The system is assumed to include the necessary sensor inputs at strategic locations, such as, temperature, voltage, pressure, etc. such that the entire array of devices are monitored in real time. This feature shall be able to execute commands for the self-preservation of component life, health, reliability and safety. The on-board diagnostic system shall trigger a visual and audible alarm to the operator when the motor controller detects a malfunction and the protection systems are activated.

2.19.4.8 The system shall protect the traction motor(s) against progressive damage. The system shall monitor conditions critical for safe operation and automatically decrease power and/or speed.

2.19.4.9 The system shall include a sub-system capable of monitoring the level of connectivity between all propulsion components and associated cabling / connectors to the buses chassis and low (12/24 vdc) systems to insure isolation. The energy storage module shall have at least two automatic means of disconnect and one manual capable of interrupting the positive and negative connections within the module enclosure, and rated for disconnect at maximum current.

2.19.4.10 The system shall have an interlock that prevents engagement when the charger is connected to the traction battery.

2.19.5 **Power Electronics / Inverter**: The previously mentioned PSC shall execute instructions and system commands to the propulsion system components via a power electronics switching module, assumed to be an "inverter". Circuitry for this device (s) shall include all necessary fuses / breakers such that the conductors, components and bus are adequately protected and safe. Connection points shall be keyed / identified such that mismatch is not physically possible. In addition these connection points shall be interlocked, such that a disconnect is automatically accompanied by an interruption at the energy storage module, both positive and negative terminals. Reconnecting the subject connector (s) will not automatically restore the connection to the energy storage module, a system reset will be required.

2.19.6 **Energy Storage System**:

2.19.6.1 The Energy Storage System (ESS) shall be of a commercial design capable of operating in the County transit environment. The ESS shall be designed, sized, and selected to ensure that the vehicle performance specifications, compatibility with opportunity charging, and other related requirements are met or exceeded, bearing in mind cost benefit and reliability variables as they relate to the characteristics of the different battery types. The power source for the vehicle shall be derived from established battery technology that has a field-proven track record of safe, reliable, and durable operation in similar traction applications. Written confirmation from the battery manufacturer attesting to the safety of the proposed battery system in the specified application shall be submitted as part of the proposal, and shall include full disclosure and discussion of any and all issues or prior incidents relating to safety.

2.19.6.2 Primary charging of the energy storage system shall be accomplished by inductive charging as needed to meet the required duty cycle. Secondary charging shall be provided from a stationary EVSE via a mechanical plug. The energy storage system shall also make use of regenerative braking. The Energy Storage System shall comply with UN/DOT 38.3 requirements for lithium batteries or similar standards for non-lithium batteries.

2.19.6.3 The Contractor shall deliver the buses with an installed, fully-charged, functioning ESS. The ESS shall be fully formed, installed and tested in accordance with the battery manufacturer's recommended practices. The ESS design, including containers, module bracing systems, thermal-management systems, battery-management systems, watering/venting systems, interconnections, fusing, and traction-controller and charger

interfaces shall be completely described in the bid. The bid shall include a detailed analysis of expected battery performance in the Design Operating Profile. The bid shall also include a comprehensive statement of the warranty terms relating to the battery, including explanation of all disclaimers within the warranty. The charge cycle and cycle life shall be stated in the proposal and a life-cycle cost analysis of the proposed battery system in the specified application shall be provided.

2.19.6.4 The battery system shall be capable of withstanding the high current and voltage profiles necessary to accomplish multiple rapid recharge events in a single day without reducing the life of the battery. Battery thermal management system shall be adequate to maintain the battery within the battery manufacturer's recommended temperature range during operation in the specified duty cycle and climatic conditions.

2.19.6.5 The batteries shall be load distributed within the bus to equalize weight between the wheels on the same axles and to achieve appropriate weight distribution between axles so as not to adversely affect handling of the bus.

2.19.7 **Battery Containers**: Battery containers shall be constructed to withstand the rigors of transit service for the design life of the buses. Construction shall be of materials compatible with the battery electrolyte. All electrical connections shall be fully shielded and hand operable. Connector and cabling design shall be such that inappropriate or unsafe connections are not possible. The system shall be designed to allow a single 3M mechanic using a 2-ton capacity forklift to remove and replace the battery within 15 minutes. The system shall be designed to allow a single 3M mechanic using a 1-ton capacity hand-operated pallet truck and contractor furnished adaptors/stands to remove and replace the each battery within 15 minutes. Vent-and-fill system components for individual packs or containers shall not require any disassembly on removal or installation of the battery packs or containers. Pack design must ensure the protection of battery cabling and vent/watering system components during pack removal and installation. The batteries, when installed, shall be secured to prevent any movement while the vehicle is in operation. Battery containers shall be supplied by the battery manufacturer. Battery containers supplied by the bus manufacturer are also acceptable provided that such containers are certified by battery manufacturer; such certification shall be submitted to procuring County concurrent with or prior to delivery of the first bus.

2.19.8 **Battery Management System**: As a minimum, the battery management system (BMS) must perform the following functions:

2.19.8.1 The BMS system must be capable of monitoring the voltage level of "blocks" containing no greater than three 12 -volt batteries within each battery pack. The BMS must be able to read and store individual battery or block voltages at a frequency of 1 data point per block every 15 seconds. The system must also monitor battery pack temperatures using no fewer than 2 thermocouples placed in and around each battery pack sampled at the same 4 samples per minute frequency.

2.19.8.2 The BMS system must be capable of communicating when a battery fault (as defined by the battery manufacturer) has occurred and must be able to identify and communicate the faulty battery in order to perform maintenance.

2.19.8.3 The BMS system must be capable of engaging prudent safety interlocks when an unsafe battery condition has been detected.

2.19.8.4 The BMS system must be able to monitor the battery state-of charge and update a gauge viewed by the operator at least once every 15 seconds. The gauge shall read 100 when the battery is fully charged and 0 when the battery is fully discharged.

2.19.8.5 The BMS system must be able to communicate all data to the bus level information system (reference TS 84) for storage and communication.

2.19.9 **Battery Thermal Management**: Battery thermal management must be powered from an onboard source at all times. Thermal management must be continuously monitored during all periods of charge and discharge with appropriate safety interlocks installed to react to adverse conditions as stated in SAE J1772. Battery temperatures must never exceed the manufacturer's recommended range during operation in the design operating profile and specified ambient conditions. Battery cooling must be sufficient to prevent the temperature from exceeding the battery manufacturer's recommended maximum temperature when the ambient temperature is above 105 degrees F for a period of 16 hours. For lead-acid batteries, battery heating must be sufficient as to maintain the battery temperature at 65 degrees F when the ambient temperature is below 10 degrees F.

2.19.10 **Cooling Systems**:

2.19.10.1 The cooling systems shall be of sufficient size to maintain all motor, power electronics and traction batteries at safe continuous operating temperatures during the most severe operations and conditions possible and in accordance with battery and drive system component manufacturers' cooling system requirements and recommendations. The cooling system fan/fans control should sense the temperatures of the operating fluids and intake air and if either is above recommended operating conditions the cooling fan should be engaged. The fan control system shall be designed with a fail-safe mode of "fan on." The cooling system shall have an ambient capacity of at least 110° F with water as coolant at sea level operation.

2.19.10.2 Operation of required battery thermal management systems shall be automatically controlled under all normally encountered operating and charging conditions and shall be powered by an onboard source at all times. Thermal management shall be continuously monitored during all periods of charge and discharge with appropriate safety interlocks installed to react to adverse conditions as stated in SAE-J1772.

2.19.10.3 Air intakes shall be properly positioned and configured to minimize the intake of road dust and debris and shall be adequately filtered.

2.19.10.4 In the event of a failure of the battery thermal management system while charging, the charge system shall be disabled and a visual alert shall be activated on the dashboard, the reset of which shall require the deliberate action of maintenance personnel. In the event of a failure of the battery thermal management system during bus operation, an audible and visual alert shall be activated on the dashboard, the reset of which shall require the deliberate action of maintenance personnel. In the event of a fire onboard a bus, thermal management fans shall be automatically turned off.

2.19.10.5 A complete description of the battery thermal management systems shall accompany the proposal. Written confirmation from the battery manufacturer attesting to the suitability of the battery thermal management system shall be submitted to the County concurrent with or prior to delivery of the first bus.

2.19.11 **Motor Cooling**: The motors shall be air-cooled. Motor temperature sensors shall be easily accessible for replacement. Motor temperature sensors shall not disable the bus at any time. Motor cooling fans shall be of durable corrosion-resistant construction, bolted-on and designed so a 2M mechanic can gain access, remove and replace fan in fifteen minutes or less. The cooling fan and mounting bracket shall be designed to withstand thermal fatigue and vibration associated with the installed configuration. The cooling fan shall be temperature controlled, operating only when the motor has reached the manufacturers maximum allowable temperature.

2.19.12 **Transmission Cooling**: The transmission shall be cooled in order to maintain operating fluids within the transmission manufacturer's recommended parameters of flow, pressure and temperature. The cooling system shall be able to cool the transmission while operating continuously at highway speeds.

2.19.13 **Electric Drive System Cooling**: Thermal management system shall maintain electric drive system components within design operating temperature limits in all driving conditions.

2.19.14 **Transmission (Conventional Powertrain)**:

2.19.14.1 If multiple speed, the transmission shall be automatic shift with torque converter, retarder and electronic controls. Gross input power, gross input torque and rated input speed shall be compatible with the propulsion system. The transmission shall be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major service. The transmission should be easily removable without disturbing the propulsion system and accessible for service.

2.19.14.2 The electronic controls shall be capable of transmitting and receiving electronic inputs and data from other drivetrain components and broadcasting that data to other vehicle systems. Communication between electronic drivetrain components and other vehicle systems shall be made using the communications networks. Electronic controls shall be compatible with either 12- or 24-volt power distribution, provide consistent shift quality and compensate for changing conditions such as variations in vehicle weight and engine power.

2.19.14.3 A nominal brake pedal application of 6 to 10 psi shall be required by the driver to engage forward or reverse range from the neutral position to prevent sudden acceleration of the bus from a parked position.

2.19.14.4 The electronically controlled transmission shall have on-board diagnostic capabilities, be able to monitor functions, store and communicate faults and vital conditions to service personnel. The transmission shall contain built-in protection software to guard against severe damage. The on-board diagnostic system shall trigger a visual alarm to the driver when the electronic control unit detects a malfunction.

2.19.14.5 An electronic transmission fluid level monitoring and protection system shall be provided.

2.19.15 **Regenerative Braking**:

2.19.15.1 The powertrain shall be equipped with regenerative braking designed to improve energy efficiency and extend brake lining service life. The application of regenerative braking shall cause a smooth and jerk-free blending of both regenerative and service brake function.

2.19.15.2 Actuation of ABS and/or automatic traction control (ATC) shall override the operation of the regenerative brake.

2.19.15.3 The system shall be designed whereby increasing the pressure on the brake pedal increases the amount of regenerative capability up until a preset point is reached within the brake pedal travel whereby the mechanical brake is engaged. Regenerative braking shall continue to operate during mechanical braking.

2.19.15.4 Amber lights shall illuminate when regenerative braking is activated. The regenerative braking shall be adjustable within the limits of the powertrain and activated when the brake pedal is depressed or upon release of accelerator pedal.

2.19.16 **Braking Resistors**: The system may include a means of maintaining dynamic braking (braking retardation) as the energy storage system approaches Maximum SOC, i.e., such as the use of braking resistors to prevent overcharging of the batteries. This same feature may be a component of the overall liquid cooling system loop and offer a means of supplementing heat for use at the main HVAC heater core and/or defroster.

2.19.17 **Mounting**: All powerplant mounting shall be mechanically isolated to minimize transfer of vibration to the body structure and provide a minimum clearance of 0.75 in. Mounts shall control the movement of the powerplant so as not to affect performance of belt-driven accessories or cause strain in piping and wiring connections to the powerplant.

2.19.18 **Service**: The Propulsion System shall be arranged for ease of access and maintenance. The Contractor shall list all special tools, fixtures or facility requirements recommended for servicing. The air cleaner, air compressor, radiator, all accessories and any other component requiring service or replacement shall be easily removable and independent of the motor and transmission removal. Radiator filler caps shall be closed with spring pressure or positive locks to prevent leakage. All fluid fill locations shall be properly labeled to help ensure that correct fluid is added. All fillers shall be easily accessible with standard funnels, pour spouts and automatic dispensing equipment.

2.19.19 **Hydraulic Systems**: Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. Critical points in the hydraulic system shall be fitted with service ports so that portable diagnostic equipment may be connected or sensors for an off-board diagnostic system permanently attached to monitor system operation when applicable. A tamper-proof priority system shall prevent the loss of power steering during operation of the bus if other devices are also powered by the hydraulic system. The hydraulic system shall operate within the allowable temperature range as specified by the lubricant manufacturer.

2.19.20 **Fluid Lines**: All lines shall be rigidly supported to prevent chafing damage, fatigue failures, degradation and tension strain. Lines should be sufficiently flexible to minimize mechanical loads on the components. Lines passing through a panel, frame or bulkhead shall be protected by grommets (or similar devices) that fit snugly to both the line and the perimeter of the hole that the line passes through to prevent chafing and wear. Pipes and fluid hoses shall not be bundled with or used to support electrical wire harnesses. Lines shall be as short as practicable and shall be routed or shielded so that failure of a line shall not allow the contents to spray or drain onto any component operable above the auto-ignition temperature of the fluid. All hoses, pipes, lines and fittings shall be specified and installed per the manufacturer's recommendations.

2.19.21 **Fittings and Clamps**:

2.19.21.1 All clamps shall maintain a constant tension at all times, expanding and contracting with the line in response to temperature changes and aging of the line material. The lines shall be designed for use in the environment where they are installed. For example, high-temperature resistant in the engine compartment, resistant to road salts near the road surface, and so on.

2.19.21.2 Compression fittings shall be standardized to prevent the intermixing of components. Compression fitting components from more than one manufacturer shall not be mixed, even if the components are known to be interchangeable.

2.19.22 **Radiator**: If equipped with a radiator system, radiator piping shall be stainless steel or brass tubing, and if practicable, hoses shall be eliminated. Necessary hoses shall be impervious to all bus fluids. All hoses shall be secured with stainless steel clamps that provide a complete 360-degree seal. The clamps shall maintain a constant tension at all times, expanding and contracting with the hose in response to temperature changes and aging of the hose material.

2.19.23 **Oil and Hydraulic Lines**: Oil and hydraulic lines shall be compatible with the substances they carry. The lines shall be designed and intended for use in the environment where they are installed. For example, high–temperature resistant in the engine compartment, resistant to road salts near the road surface, and so on. Lines within the engine compartment shall be composed of steel tubing where practicable, except in locations where flexible lines are required. Hydraulic lines of the same size and with the same fittings as those on other piping systems of the bus, but not interchangeable, shall be tagged or marked for use on the hydraulic system only.

2.20 **Structure**: The structure of the bus shall be designed to withstand the transit service conditions typical of an urban duty cycle throughout its service life. The vehicle structural frame shall be designed to operate with minimal maintenance throughout the 12-year design operating profile. The design operating profile specified by the County shall be considered for this purpose.

2.20.1 **Altoona Testing**:

2.20.1.1 Prior to delivery and acceptance of buses, the vehicle must have completed any FTA-required Altoona testing. Any items that required repeated repairs or replacement must undergo the corrective action with supporting test and analysis. A report clearly describing and explaining the failures and corrective actions taken to ensure any and all such failures will not occur shall be submitted to the County. All buses must have corrective actions applied prior to vehicle acceptance.

2.20.1.2 Prior to the start of any bus manufacturing or assembly processes, the structure of the proposed bus model shall have undergone appropriate structural testing and/or analysis, including the complete regimen of FTA-required Altoona tests. If available, the Altoona Test Report shall be provided to the County with the Proposal submittal.

2.20.1.3 If not available, then the report shall be provided prior to start of bus production and the County shall have access to all data produced by Altoona. Prior to assembly of the first bus, the OEM shall provide the County with a completed report of Altoona testing for the proposed bus

model along with a plan of corrective action to address deficiencies, breakdowns and other issues identified during Altoona testing. The bus model tested shall match the bus model proposed for procurement, including structure, axles and drive-train.

2.20.1.4 If the bus is exempt from the Altoona testing requirement, the OEM must provide supporting documentation, including FTA waiver and contractors justification with the Proposal Submission. Any required corrective action from testing must be implemented on the operational vehicle at an appropriate time.

2.20.2 **Structural Validation**: The structure of the bus shall have undergone appropriate structural testing and/or analysis. At minimum, appropriate structural testing and analysis shall include Altoona testing and Finite Element Analysis (FEA). The FEA Report shall be provided to the County prior to assembly of the first bus.

2.20.3 **Distortion**: The bus, loaded to GVWR and under static conditions, shall not exhibit deflection or deformation that impairs the operation of the steering mechanism, doors, windows, passenger escape mechanisms or service doors. Static conditions shall include the vehicle at rest with any one wheel or dual set of wheels on a 6 in. curb or in a 6 in. deep hole.

2.20.4 **Resonance and Vibration**: All structure, body and panel-bending mode frequencies, including vertical, lateral and torsional modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible or sensible resonant vibrations during normal service.

2.20.5 **Motor Compartment Bulkheads**: The passenger and motor compartment shall be separated by fire-resistant bulkheads. The motor compartment shall include areas where the motor and transmission are housed. This bulkhead shall preclude or retard propagation of a motor compartment fire into the passenger compartment and shall be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90A, dated October 20, 1993. Only necessary openings shall be allowed in the bulkhead, and these shall be fire-resistant. Any passageways for the climate control system air shall be separated from the motor compartment by fire-resistant material. Piping through the bulkhead shall have fire-resistant fittings sealed at the bulkhead. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the bulkhead. Motor compartment access panels in the bulkhead shall be fabricated of fire-resistant material and secured with fire-resistant fasteners. These panels, their fasteners and the bulkhead shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the bulkhead.

2.20.6 **Crashworthiness**:

2.20.6.1 The bus body and roof structure shall withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6 in. reduction in any interior dimension. Windows shall remain in place and shall not open under such a load. These requirements must be met without the roof-mounted equipment installed.

2.20.6.2 The bus shall withstand a 25 mph impact by a 4000-pound automobile at any side, excluding doorways, along either side of the bus with no more than 3 in. of permanent structural deformation at seated passenger hip height. This impact shall not result in sharp edges or protrusions in the bus interior.

2.20.6.3 Exterior panels below 35 in. from ground level shall withstand a static load of 2000 lbs. applied perpendicular to the bus by a pad no larger than 5 sq. in. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus.

2.20.6.4 Test reports or detailed engineering reports validating the crashworthiness shall be provided prior to assembly of the first bus. If a Finite Element Analysis FEA is provided as proof of crashworthiness for the proposed vehicle, it must include a qualified engineering analysis and report for crashworthiness.

2.20.7 **Corrosion**: The bus flooring, sides, roof, understructure and axle suspension components shall be designed to resist corrosion or deterioration from atmospheric conditions and de-icing materials for a period of 12 years or 500,000 miles, whichever comes first. It shall maintain structural integrity and nearly maintain original appearance throughout its service life, with the County's use of proper cleaning and neutralizing agents. All materials that are not inherently corrosion resistant shall be protected with corrosion-resistant coatings. All joints and connections of dissimilar metals shall be corrosion resistant and shall be protected from galvanic corrosion. Representative samples of all materials and connections shall withstand a two- week (336-hour) salt spray test in accordance with ASTM Procedure B-117 with no structural detrimental effects to normally visible surfaces and no weight loss of over 1 percent.

2.20.8 **Towing**:

2.20.8.1 Each towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within 20 degrees of the longitudinal axis of the bus. If applicable, the rear towing device(s) shall not provide a toehold for unauthorized riders. The method of attaching the towing device shall not require the removal, or disconnection, of front suspension or steering components. Removal of the bike rack is permitted for attachment of towing devices.

2.20.8.2 A Cole Hersee #12063 7-way plug connector permanently mounted at the front of the bus shall provide for bus tail lamp, marker, stop and turn signal lamp operation as controlled from the towing vehicle. The connector shall include a spring-loaded dust- and water-resistant cap. Shop air connectors shall be provided at the front and rear of the bus and shall be capable of supplying all pneumatic systems of the bus with externally sourced compressed air. The location of these shop air connectors shall facilitate towing operations.

2.20.8.3 An additional towing air connection shall be provided at the front of the bus to allow the towing vehicle to control and operate the bus braking system during a towing operation.

2.20.8.4 The front towing devices shall allow attachment of adapters for a rigid tow bar and shall permit the lifting of the bus until the front wheels are clear off the ground in order to position the bus on the towing equipment by the front wheels. These devices shall also permit common flat towing.

2.20.8.5 Two rear recovery devices/tie downs shall permit lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access

to provisions for front towing of bus. The method of attaching the tow bar or adapter shall require the specific approval of the County. Any tow bar or adapter exceeding 50 lbs. should have means to maneuver or allow for ease of use and application. Each towing device shall accommodate a crane hook with a 1 or 1.25" in. throat.

2.20.9 **Jacking**: It shall be possible to safely jack up the bus, at curb weight, with a common 10-ton floor jack with or without special adapter, when a tire or dual set is completely flat and the bus is on a level, hard surface, without crawling under any portion of the bus. Jacking from a single point shall permit raising the bus sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6 in. high run-up block not wider than a single tire. The bus shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage. Jacking pads shall be painted safety yellow. Apply decals to identify location of jacking pads.

2.20.10 **Hoisting**: The bus axles or jacking plates shall accommodate the lifting pads of a two-post hoist system. Jacking plates, if used as hoisting pads, shall be designed to prevent the bus from falling off the hoist. Other pads or the bus structure shall support the bus on jack stands independent of the hoist.

2.20.11 **Floor Design**:

2.20.11.1 The floor shall be essentially a continuous plane, except at the wheel housings and platforms. Where the floor meets the walls of the bus, as well as other vertical surfaces such as platform risers, the surface edges shall be blended with a circular section of radius not less than ¼ in. or installed in a fully sealed butt joint. Similarly, a molding or cover shall prevent debris accumulation between the floor and wheel housings if required. The vehicle floor in the area of the entrance and exit doors shall have a lateral slope not exceeding 2 degrees to allow for drainage.

2.20.11.2 The floor design shall consist of two levels (bi-level construction). Aft of the rear door extending to the rear settee riser, the floor height may be raised to a height no more than 21 in. above the lower level, with equally spaced steps. An increase slope shall be allowed on the upper level, not to exceed 3.5 degrees off the horizontal.

2.20.11.3 The floor shall consist of the subfloor and the floor covering that will last the life of the bus. The floor as assembled, including the sealer, attachments and covering, shall be waterproof, non-hygroscopic and resistant to mold growth. The subfloor shall be resistant to the effects of moisture, including decay (dry rot). It shall be impervious to wood-destroying insects such as termites.

2.20.12 **Floor Strength**: The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement and designed to last the life of the bus. Sheet metal screws shall not be used to retain the floor, and all floor fasteners shall be serviceable from one side only. Any adhesives, bolts or screws used to secure the floor to the structure shall last and remain effective throughout the life of the coach. Tapping plates, if used for the floor fasteners, shall be no less than the same thickness as a standard nut, and all floor fasteners shall be secured and protected from corrosion for the service life of the bus. The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 in. from the normal plane. The floor shall withstand the

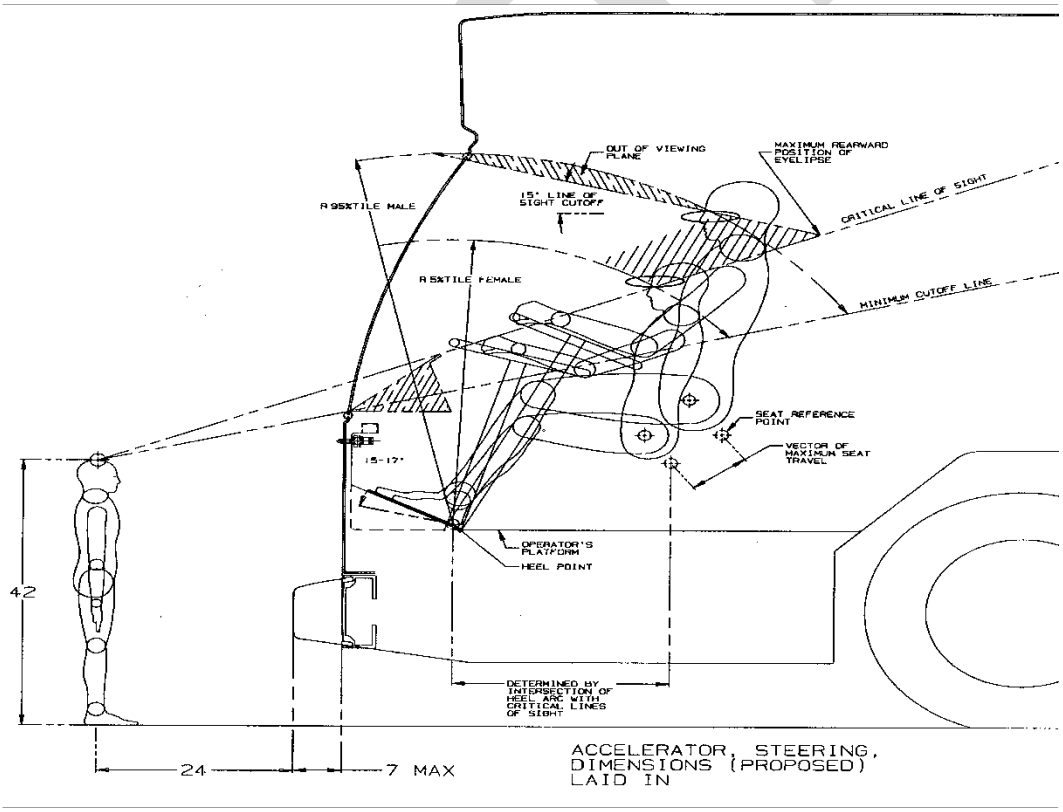
application of 2.5 times gross load weight without permanent detrimental deformation. The floor, with coverings applied, shall withstand a static load of at least 150 lbs. applied through the flat end of a ½ in. diameter rod, with 1/32-inch radius, without permanent visible deformation.

2.20.13 **Platforms**:

2.20.13.1 **Driver's Area**: The covering of platform surfaces and risers, except where otherwise indicated, shall be the same material as specified for floor covering. Trim shall be provided along top edges of platforms unless integral nosing is provided.

2.20.13.2 **Driver's Platform**: The driver's platform shall be of a height such that, in a seated position, the driver can see an object located at an elevation of 42 in. above the road surface, 24 in. from the leading edge of the bumper. Notwithstanding this requirement, the platform height shall not position the driver such that the driver's vertical upward view is less than 15 degrees. A warning decal or sign shall be provided to alert the driver to the change in floor level. Figure 3 illustrates a means by which the platform height can be determined, using the critical line of sight.

FIGURE 3
Determining Platform Height



2.20.14 **Farebox**: Farebox placement should minimize impact to passenger access and minimize interference with the driver's line of sight. COUNTY shall supply and install the actual farebox, a Diamond Manufacturing Model RV, post-delivery. The bus manufacturer shall pre-wire and drill the base holes. If the driver's platform is higher

than 12 in., then the farebox is to be mounted on a platform of suitable height to provide accessibility for the driver without compromising passengers' access.

2.20.15 **Rear Step Area to Rear Area**: If the vehicle is of a bi-level floor design, a rear step area shall be provided along the center aisle of the bus to facilitate passenger traffic between the upper and lower floor levels. This step area shall be cut into the rear platform and shall be approximately the aisle width, a minimum 12 in. deep and approximately half the height of the upper level relative to the lower level. The horizontal surface of this platform shall be covered with skid-resistant material with a visually contrasting nosing and shall be sloped slightly for drainage. A warning decal or sign shall be provided at the immediate platform area to alert passengers to the change in floor level.

2.20.16 **Wheel Housing Design**: Sufficient clearance and air circulation shall be provided around the tires, wheels and brakes to preclude overheating when the bus is operating on the design operating profile. Wheel housings shall be constructed of corrosion-resistant and fire-resistant material.

2.20.16.1 Interference between the tires and any portion of the bus shall not be possible in maneuvers up to the limit of tire adhesion with weights from curb weight to GVWR. Wheel housings shall be adequately reinforced where seat pedestals are installed. Wheel housings shall have sufficient sound insulation to minimize tire and road noise and meet all noise requirements of this specification.

2.20.16.2 Design and construction of front wheel housings shall allow for the installation of a radio or electronic equipment storage compartment on the interior top surface, or its use as a luggage rack.

2.20.16.3 The finish of the front wheel housings shall be scratch-resistant and complement interior finishes of the bus to minimize the visual impact of the wheel housing. If fiberglass wheel housings are provided, then they shall be color-impregnated to match interior finishes. The lower portion extending to approximately 10 to 12 in. above floor shall be equipped with stainless steel kick panels.

2.20.16.4 Wheel housings, as installed and trimmed, shall withstand impacts of a 2 in. steel ball with at least 200 ft.- lbs. of energy without penetration.

2.20.16.5 Wheel housings not equipped with seats or equipment enclosure shall have a horizontal assist mounted on the top portion of the housing no more than 4 in. higher than the wheel well housing.

2.21 **Chassis**:

2.21.1 **Suspension**: The front, rear and mid (if articulated) suspensions shall be pneumatic type. The basic suspension system shall last the service life of the bus without major overhaul or replacement. Adjustment points shall be minimized and shall not be subject to a loss of adjustment in service. Routine adjustments shall be easily accomplished by limiting the removal or disconnecting the components.

2.21.2 **Alignment**: All axles should be properly aligned so the vehicle tracks accurately within the size and geometry of the vehicle.

2.21.3 **Suspension Travel**: The suspension system shall permit a minimum wheel travel of 2.75 in. jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 2.75 in. rebound-downward travel when the bus comes off a bump and

the wheels fall relative to the body. Elastomeric bumpers shall be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspensions shall incorporate appropriate devices for automatic height control so that regardless of load the bus height relative to the centerline of the wheels does not change more than ½ in. at any point from the height required. The safe operation of a bus cannot be impacted by ride height up to1 in. from design normal ride height.

2.21.4 **Damping**: Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping shall be sufficient to control coach motion to three cycles or less after hitting road perturbations. The shock absorber bushing shall be made of elastomeric material that will last the life of the shock absorber. The damper shall incorporate a secondary hydraulic rebound stop.

2.21.5 **Lubrication**: All elements of steering, suspension and drive systems requiring scheduled lubrication shall be provided with grease fittings conforming to SAE Standard J534. These fittings shall be located for ease of inspection and shall be accessible with a standard grease gun from a pit or with the bus on a hoist. Each element requiring lubrication shall have its own grease fitting with a relief path. The lubricant specified shall be standard for all elements on the bus serviced by standard fittings and shall be required no less than every 6000 miles.

2.21.6 **Kneeling**: A kneeling system shall lower the front of the bus a minimum of 2.5 in. during loading or unloading operations regardless of load up to GVWR, measured at the longitudinal centerline of the entrance door(s) by the driver. The kneeling control shall provide the following functions:

2.21.6.1 Downward control must be held to allow downward kneeling movement.

2.21.6.2 Release of the control during downward movement must completely stop the lowering motion and hold the height of the bus at that position.

2.21.6.3 Upward control actuation must allow the bus to return to normal floor height without the driver having to hold the control.

2.21.6.4 The brake and throttle interlock shall prevent movement when the bus is kneeled. The kneeling control shall be disabled when the bus is in motion. The bus shall kneel at a maximum rate of 1.25 in. per second at essentially a constant rate. After kneeling, the bus shall rise within 3 seconds to a height permitting the bus to resume service and shall rise to the correct operating height within 7 seconds regardless of load up to GVWR. During the lowering and raising operation, the maximum vertical acceleration shall not exceed 0.2g, and the jerk shall not exceed 0.3g/second.

2.21.6.5 An indicator visible to the driver shall be illuminated until the bus is raised to a height adequate for safe street travel. An audible warning alarm will sound simultaneously with the operation of the kneeler to alert passengers and bystanders. A warning light mounted near the curbside of the front door, a minimum 2.5 in. diameter amber lens, shall be provided that will blink when the kneel feature is activated.

Kneeling shall not be operational while the wheelchair ramp is deployed or in operation.

2.21.7 **Wheels**: All wheels shall be interchangeable and shall be removable without a puller. Wheels shall be compatible with tires in size and load-carrying capacity. Front wheels and tires shall be balanced as an assembly per SAE J1986. Wheels shall be two-sided machine finish aluminum rims with Dura-Brite, Alcoa.

2.21.8 **Tires**: Tires shall be suitable for the conditions of transit service and sustained operation at the maximum speed capability of the bus. Load on any tire at GVWR shall not exceed the tire Supplier's rating. Tires shall be Michelin XZU3 transit tires. One spare wheel and mounted tire shall be delivered with each bus.

2.21.9 **Steering**: Power steering hydraulic pump shall be electrically driven or electrically assisted steering shall be provided to reduce steering effort.

2.21.10 **Steering Axle**: The front axle shall be solid beam, non-driving with a load rating sufficient for the bus loaded to GVWR and shall be equipped with grease type front wheel bearings and seals.

2.21.10.1 All friction points on the front axle shall be equipped with replaceable bushings or inserts and, if needed, lubrication fittings easily accessible from a pit or hoist.

2.21.10.2 The steering geometry of the outside (frontlock) wheel shall be within 2 degrees of true Ackerman up to 50 percent lock measured at the inside (backlock) wheel. The steering geometry shall be within 3 degrees of true Ackerman for the remaining 100 percent lock measured at the inside (backlock) wheel.

2.21.11 **Steering Turning Effort**: Steering effort shall be measured with the bus at GVWR, stopped with the brakes released and on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure.

2.21.11.1 Under these conditions, the torque required to turn the steering wheel 10 degrees shall be no less than 5 ft-lbs and no more than 10 ft-lbs. Steering torque may increase to 70 ft-lbs when the wheels are approaching the steering stops, as the relief valve activates.

2.21.11.2 Power steering failure shall not result in loss of steering control. With the bus in operation, the steering effort shall not exceed 55 lbs. at the steering wheel rim, and perceived free play in the steering system shall not materially increase as a result of power assist failure. Gearing shall require no more than seven turns of the steering wheel lock-to-lock.

2.21.11.3 Caster angle shall be selected to provide a tendency for the return of the front wheels to the straight position with minimal assistance from the driver.

2.21.12 **Steering Wheel, General**: The steering wheel diameter shall be 18-18.5" in. with 3 or 4 spokes; the rim diameter shall be ⅞ in. to 1¼ in. and shaped for firm grip with comfort for long periods of time. Steering wheel spokes and wheel thickness shall ensure visibility of the dashboard so that vital instrumentation is clearly visible at center neutral position (within the range of a 95th-percentile male, as described in SAE

1050a, Sections 4.2.2 and 4.2.3). Placement of steering column must be as far forward as possible, but either in line with or behind the instrument cluster.

2.21.13 **Steering Column Tilt**: The steering column shall have full tilt capability with an adjustment range of no less than 40 degrees from the vertical and easily adjustable by the driver.

2.21.14 **Steering Wheel Telescopic Adjustment**: The steering wheel shall have full telescoping capability and have a minimum telescopic range of 2 in. and a minimum low-end adjustment of 29 in., measured from the top of the steering wheel rim in the horizontal position to the cab floor at the heel point.

TABLE 4
Steering Wheel Height[1] Relative to Angle of Slope

At Minimum Telescopic Height Adjustment (29 in.)		At Maximum Telescopic Height Adjustment (5 in.)	
Angle of Slope	**Height (in)**	**Angle of Slope**	**Height (in)**
0 degrees	29 in.	0 degrees	34 in.
15 degrees	26.2 in.	15 degrees	31.2 in.
25 degrees	24.6 in.	25 degrees	29.6 in.
35 degrees	22.5 in.	35 degrees	27.5 in.

1. Measured from bottom portion closest to driver.

2.21.15 **Drive Axle**: The bus shall be driven by a heavy-duty axle with a load rating sufficient for the bus loaded to GVWR. The drive axle shall have a design life to operate for not less than 500,000 miles on the design operating profile without replacement or major repairs. The lubricant drain plug shall be magnetic type. If a planetary gear design is employed, the oil level in the planetary gears shall be easily checked through the plug or sight gauge. The axle and driveshaft components shall be rated for both propulsion and retardation modes with respect to duty cycle. Drive axle oil shall be synthetic, extended service life. The retardation duty cycle can be more aggressive than propulsion. The drive shaft shall be guarded to prevent hitting any critical systems, including brake lines, coach floor or the ground, in the event of a tube or universal joint failure. A S&A Fleetwatch Model 392 hubometer, without tenths or guard, shall be mounted on the curbside hub.

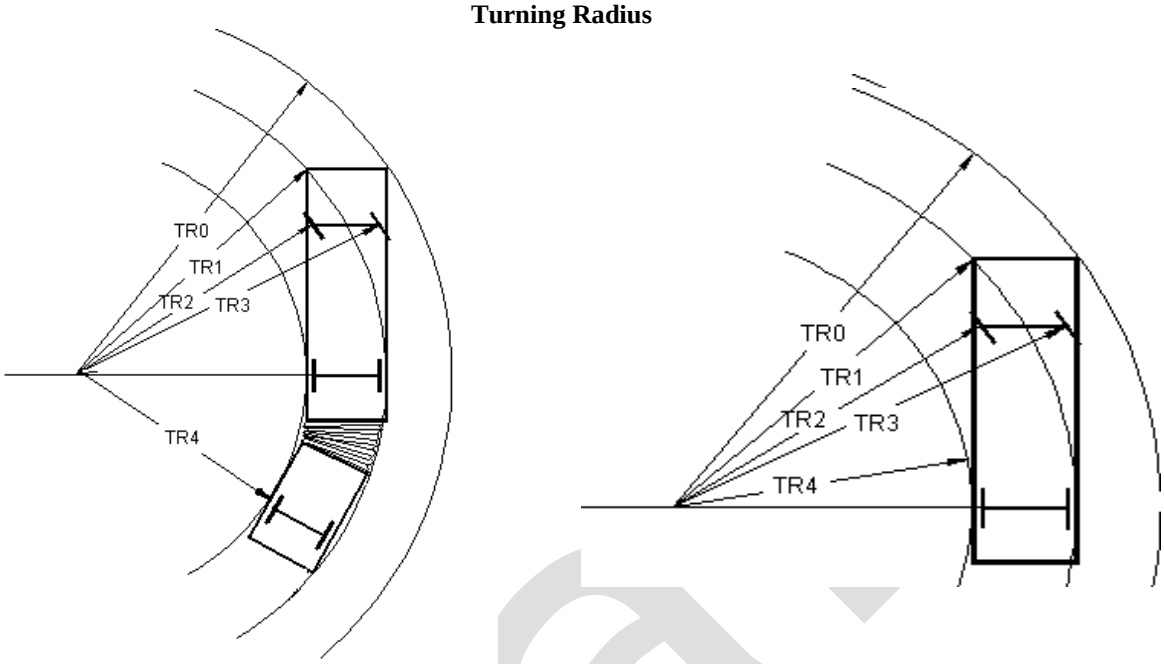
2.21.16 **Turning Radius**: Reference Table 5

TABLE 5
Maximum Turning Radius

Bus Length (approximate)	Maximum Turning Radius (see Figure 4)
35 ft.	39 ft. (TR0)
40 ft.	44 ft. (TR0)

A S&A Fleetwatch Model 392 hubodometer, without tenths or guard, shall be mounted on the curbside hub.

FIGURE 4
Turning Radius



2.21.17 **Service Brake**: Brakes shall be self-adjusting. Brake wear indicators (visible brake sensors) shall be provided on exposed push rods.

2.21.18 **Actuation**: Service brakes shall be controlled and actuated by a compressed air system. Force to activate the brake pedal control shall be an essentially linear function of the bus deceleration and shall not exceed 70 lbs. at a point 7 in. above the heel point of the pedal to achieve maximum braking. The heel point is the location of the driver's heel when his or her foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. The ECU for the ABS system shall be protected, yet in an accessible location to allow for ease of service. Manufacturer shall provide the FMVSS 121 Test Report upon request to demonstrate braking capability. The total braking effort shall be distributed between all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations. Manufacturer shall demonstrate compliance by providing a copy of a thermo dynamic brake balance test upon request. Microprocessor controlled automatic traction control (ATC) shall be provided.

2.21.19 **Friction Material**: The brake linings shall be made of non-asbestos material. In order to aid maintenance personnel in determining extent of wear, a provision such as a scribe line or chamfer indicating the thickness at which replacement becomes necessary shall be provided on each brake lining. The complete brake lining wear indicator shall be clearly visible from the hoist or pit without removing backing plates.

2.21.20 **Hubs and Drums**: Replaceable wheel bearing seals shall run on replaceable wear surfaces or be of an integral wear surface sealed design. Wheel bearing and hub seals and unitized hub assemblies shall not leak or weep lubricant when operating on the design operating profile for the duration of the initial manufacturer's warranty. The bus shall be equipped with disc brakes on all axles, and the brake discs shall allow machining of each side of the disc to obtain smooth surfaces per manufacturer's specifications. The brake

system material and design shall be selected to absorb and dissipate heat quickly so that the heat generated during braking operation does not glaze brake linings.

2.21.21 **Parking/Emergency Brake**: The parking brake shall be a spring-operated system, actuated by a valve that exhausts compressed air to apply the brakes. The parking brake may be manually enabled when the air pressure is at the operating level per FMVSS 121.

2.21.22 **Passenger Door Interlocks**: To prevent opening mid and rear passenger doors while the bus is in motion, a speed sensor shall be integrated with the door controls to prevent the mid/rear doors from being enabled or opened unless the bus speed is less than 2 mph.

2.21.22.1 To preclude movement of the bus, an accelerator interlock shall lock the accelerator in the closed position, and a brake interlock shall engage the service brake system to stop movement of the bus when the driver's door control is moved to a rear door enable or open position, or rear door panel is opened more than 3 in. from the fully closed position (as measured at the leading edge of the door panel). The interlock engagement shall bring the bus to a smooth stop and shall be capable of holding a fully loaded bus on a 6 percent grade, until the interlocks are released. These interlock functions shall be active whenever the vehicle Master Run Switch is in any run position.

2.21.22.2 All door systems employing brake and accelerator interlocks shall be supplied with supporting failure mode effects analysis (FEMA) documentation, which demonstrates that failure modes are of a failsafe type, thereby never allowing the possibility of release of interlock while an interlocked door is in and unsecured condition, unless the door master switch has been actuated to intentionally release the interlock.

2.21.22.3 An accelerator interlock shall lock the accelerator in the closed position, and a brake interlock shall engage the service brake system to stop movement of the bus whenever front doors are open.

2.21.23 Pneumatic System: The bus air system shall operate the air-powered accessories and the braking system with reserve capacity. New buses shall not leak down more than 5 psi over a 15-minute period of time as indicated on the dash gauge. Provision shall be made to apply shop air to the bus air systems. A quick disconnect fitting shall be easily accessible and located in the engine compartment and near the front bumper area for towing. Retained caps or an enclosure shall be installed to protect fitting against dirt and moisture when not in use. Air for the compressor shall be filtered. The air system shall be protected per FMVSS 121.

2.21.24 **Air Compressor**: The electrically driven air compressor shall be sized to charge the air system from 40 psi to the governor cut-off pressure in less than 4 minutes.

2.21.25 **Air Lines and Fittings**: Air lines, except necessary flexible lines, shall conform to the installation and material requirements of SAE Standard J1149 for copper tubing with standard, brass, flared or ball sleeve fittings, or SAE Standard J844 for nylon tubing if not subject to temperatures over 200 ^{O}F. The air on the delivery side of the compressor where it enters nylon housing shall not be above the maximum limits as stated in SAE J844. Nylon tubing shall be installed in accordance with the following color-coding standards:

2.21.25.1 G**reen:** Indicates primary brakes and supply.
2.21.25.2 **Red:** Indicates secondary brakes.
2.21.25.3 **Brown:** Indicates parking brake
2.21.25.4 **Yellow:** Indicates compressor governor signal.
2.21.25.5 **Black:** Indicates accessories.

2.21.25.6 **Blue:** Indicates suspension. (Optional)

2.21.25.7 Line supports shall prevent movement, flexing, tension, strain and vibration. Copper lines shall be supported to prevent the lines from touching one another or any component of the bus. To the extent practicable and before installation, the lines shall be pre-bent on a fixture that prevents tube flattening or excessive local strain. Copper lines shall be bent only once at any point, including pre-bending and installation. Rigid lines shall be supported at no more than 5-ft intervals. Nylon lines may be grouped and shall be supported at 30 in. intervals or less.

2.21.25.8 The compressor discharge line between power plant and body-mounted equipment shall be flexible convoluted copper or stainless steel line, or may be flexible Teflon hose with a braided stainless steel jacket. Other lines necessary to maintain system reliability shall be flexible Teflon hose with a braided stainless steel jacket. End fittings shall be standard SAE or JIC brass or steel, flanged, swivel-type fittings. Flexible hoses shall be as short as practicable and individually supported. They shall not touch one another or any part of the bus except for the supporting grommets. Flexible lines shall be supported at 30" intervals or less.

2.21.25.9 Air lines shall be clean before installation and shall be installed to minimize air leaks. All air lines shall be routed to prevent water traps to the extent possible. Grommets or insulated clamps shall protect the air lines at all points where they pass through understructure components.

2.21.26 **Air Reservoirs**: All air reservoirs shall meet the requirements of FMVSS Standard 121 and SAE Standard J10 and shall be equipped with drain valves that discharge below floor level with lines routed to eliminate the possibility of water traps and/or freezing in the drain line.. Major structural members shall protect these valves and any automatic moisture ejector valves from road hazards. Reservoirs shall be sloped toward the drain valve.

2.21.27 **Air System Dryer**: The air system shall be equipped with an air dryer located before the no. 1 air tank and as far from the compressor as possible to allow air to cool prior to entering the air dryer. The air dryer shall be an SKF High Capacity Turbo 2000 with the Filtration Plus Option, heated.

2.22 **Electrical, Electronic And Data Communication Systems**: The electrical system will consist of vehicle battery systems and components that generate, distribute and store power throughout the vehicle (i.e. generator, voltage regulator, wiring, relays, and connectors). Electronic devices are individual systems and components that process and store data, integrate electronic information or perform other specific functions. The data communication system consists of the bi-directional communications networks that electronic devices use to share data with other electronic devices and systems. Communication networks are essential to integrating electronic functions, both onboard the vehicle and off. Information level systems that require vehicle information for their operations or provide information shall adhere to J1939 data standard. Data communications systems are divided into three levels to reflect the use of multiple data networks:

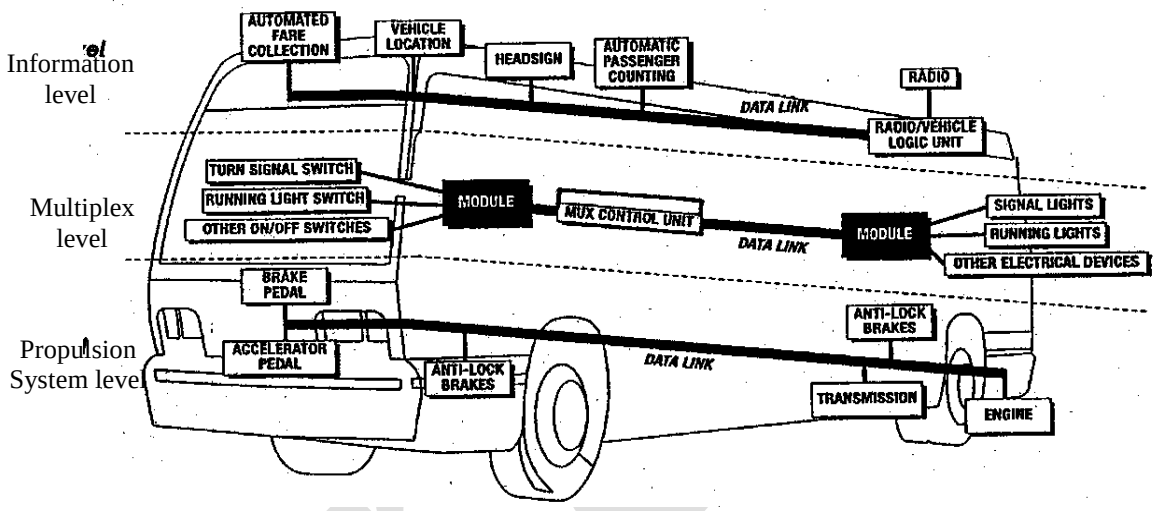
2.22.1 **Propulsion System level**: Components related to the drivetrain including the propulsion system components (electric energy storage, motors, inverters/converters), and anti-lock braking system (ABS), which may include traction control (ATC).

2.22.2 **Information level**: Components whose primary function is the collection, control or display of data that is not necessary to the safe drivability of the vehicle (i.e., the vehicle will continue to operate when those functions are inoperable). These components typically consist of those required for automatic vehicle location (AVL) systems, destination signs,

fare boxes, passenger counters, radio systems, automated voice and signage systems, video surveillance and similar components.

2.22.3 **Multiplex level**: Electrical or electronic devices controlled through input/output signals such as discrete, analog and serial data information (i.e., on/off switch inputs, relay or relay control outputs). Multiplexing is used to control components not typically found on the drivetrain or information levels, such as lights; wheelchair lifts; doors; heating, ventilation and air conditioning (HVAC) systems; and gateway devices.

FIGURE 5
Data Communications Systems Levels



2.23.4 **Modular Design**: Design of the electrical, electronic and data communication systems shall be modular so that each electronic device, apparatus panel, or wiring bundle is easily separable from its interconnect by means of connectors. Propulsion System wiring shall be an independent wiring harness. Replacement of the propulsions system compartment wiring harness(es) shall not require pulling wires through any bulkhead or removing any terminals from the wires.

2.23.5 **Environmental and Mounting Requirements**: The electrical system and its electronic components shall be capable of operating in the area of the vehicle in which they will be installed, as recommended in SAE J1455. Electrical and electronic equipment shall not be located in an environment that will reduce the performance or shorten the life of the component or electrical system when operating within the design operating profile. As a recommendation, no vehicle component shall generate, or be affected by, electromagnetic interference or radio frequency interference (EMI/RFI) that can disturb the performance of electrical/electronic equipment as defined in SAE J1113 and UNECE Council Directive 95/54 (R 10). The County shall follow recommendations from bus manufacturers and subsystem Suppliers regarding methods to prevent damage from voltage spikes generated from welding, jump starts, shorts, etc.

2.23.6 **Hardware Mounting**: The mounting of the hardware shall not be used to provide the sole source ground, and all hardware shall be isolated from potential EMI/RFI, as referenced in SAE J1113. All electrical/electronic hardware mounted in the interior of the vehicle shall be inaccessible to passengers and hidden from view unless intended to be viewed. The hardware shall be mounted in such a manner as to protect it from splash or spray. All electrical/electronic hardware mounted on the exterior of the vehicle that is not designed to be installed in an exposed environment shall be mounted in a sealed enclosure. All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.

2.23.7 **Low-Voltage Batteries (24V)**: Should low voltage batteries be used, Group 31 Series deep cycling maintenance-free battery units shall be provided. Each battery shall have a minimum of 700 cold cranking amps. Each battery shall have a purchase date no more than one year from the date of release for shipment to the County.

2.23.8 **Low Voltage Battery Cables**: The battery terminal ends and cables shall be color-coded with red for the primary positive, black for negative and another color for any intermediate voltage cables. Positive and negative battery cables shall not cross each other if at all possible, be flexible and sufficiently long to reach the batteries with the tray in the extended position without stretching or pulling on any connection and shall not lie directly on top of the batteries. Except as interrupted by the master battery switch, battery and starter wiring shall be continuous cables with connections secured by bolted terminals and shall conform to specification requirements of SAE Standard J1127 Type SGT, SGX or GXL and SAE Recommended Practice J541. 2/0 cable or greater recommended.

2.23.9 **Low Voltage Battery Compartment**: The battery compartment shall prevent accumulation of snow, ice and debris on top of the batteries and shall be vented and self-draining. It shall be accessible only from the outside of the vehicle. All components within the battery compartment, and the compartment itself, shall be protected from damage or corrosion from the electrolyte. The inside surface of the battery compartment's access door shall be electrically insulated, as required, to prevent the battery terminals from shorting on the door if the door is damaged in an accident or if a battery comes loose.

2.23.9.1 The vehicle shall be equipped with a 12VDC and 24VDC quick disconnect switch(es). The battery compartment door shall conveniently

accommodate operation of the 12VDC and 24VDC quick disconnect switch(es).

2.23.9.2 The battery quick disconnect access door shall be identified with a decal. The decal size shall not be less than 3.5 × 5 in. (8.89 × 12.7 cm).

2.23.9.3 The battery hold-down bracket shall be constructed of a non-metallic material (plastic or fiberglass).

2.23.9.4 The access door shall not require any special locking devices to gain access to the switch, and it shall be accessible without removing or lifting the panel. The door shall be flush-fitting and incorporate a spring tensioner or equal to retain the door in a closed position when not in use.

2.23.9.5 The batteries shall be securely mounted on a stainless steel or equivalent tray that can accommodate the size and weight of the batteries. The battery tray shall pull out easily and properly support the batteries while they are being serviced. The tray shall allow each battery cell to be easily serviced and filled. A locking device shall retain the battery tray to the stowed position.

2.23.9.6 If not located in the engine compartment, the same fire-resistant properties and fire suppression system must apply to the battery compartment. No sparking devices should be located within the battery box.

2.23.10 **Auxiliary Electronic Power Supply**: If required, gel-pack, or any form of sealed (non-venting) batteries used for auxiliary power are allowed to be mounted on the interior of the vehicle if they are contained in an enclosed, non-airtight compartment and accessible only to maintenance personnel. This compartment shall contain a warning label prohibiting the use of lead-acid batteries.

2.23.11 **Master Battery Switch**: A single master switch shall be provided near the battery compartment for the disconnecting of all battery positives (12V and 24V), except for safety devices such as the fire suppression system and other systems as specified. The location of the master battery switch shall be clearly identified on the exterior access panel, be accessible in less than 10 seconds for deactivation and prevent corrosion from fumes and battery acid when the batteries are washed off or are in normal service.

2.23.12 Turning the master switch off with the powerplant operating shall shut off the propulsion system and disconnect the high voltage energy storage device. The master switch shall be capable of carrying and interrupting the total circuit load.

2.23.13 **Low-Voltage Generation and Distribution**: The low-voltage generating system shall maintain the charge on fully charged batteries. Voltage monitoring and over-voltage output protection (recommended at 32V) shall be provided. Dedicated power and ground shall be provided as specified by the component or system manufacturer. Cabling to the equipment must be sized to supply the current requirements with no greater than a 5 percent volt drop across the length of the cable.

2.23.14 **Circuit Protection**: All branch circuits, except battery-to-starting motor and battery-to-generator/alternator circuits, shall be protected by current-limiting devices such as circuit breakers, fuses or solid state devices sized to the requirements of the circuit. Electronic

circuit protection for the cranking motor shall be provided to prevent engaging of the motor for more than 30 seconds at a time to prevent overheating. The circuit breakers or fuses shall be easily accessible for authorized personnel. Fuses shall be used only where it can be demonstrated that circuit breakers are not practicable. This requirement applies to in-line fuses supplied by either the Contractor or a Supplier. Fuse holders shall be constructed to be rugged and waterproof.

2.23.14.1 All manual reset circuit breakers critical to the operation of the bus shall be mounted in a location convenient to the County mechanic with visible indication of open circuits. The County shall consider the application of automatic reset circuit breakers on a case-by-case basis. The Contractor shall show all in-line fuses in the final harness drawings. Any manually resettable circuit breakers shall provide a visible indication of open circuits. Any manually resettable circuit breakers shall provide a visible indication of open circuits.

2.23.14.2 Circuit breakers or fuses shall be sized to a minimum of 15 percent larger than the total circuit load. The current rating for the wire used for each circuit must exceed the size of the circuit protection being used.

2.23.14.3 Multiplex system shall be capable of monitoring loads via distribution branch circuits and at components to provide detection of "shorts", "opens" and or loads exhibiting abnormal current behavior that would be indicative of a fault.

2.23.15 **Low Voltage Grounds**: The low voltage (12/24 vdc) battery shall be grounded to the vehicle chassis/frame at one location only, as close to the batteries as possible. When using a chassis ground system, the chassis shall be grounded to the frame in multiple locations, evenly distributed throughout the vehicle to eliminate ground loops. No more than four ground ring/spade terminal connections shall be made per ground stud. Electronic equipment requiring an isolated ground to the battery (i.e., electronic ground) shall not be grounded through the chassis. The high voltage propulsion system shall be isolated from the low voltage system at all levels, AC and/or DC, to include "ground".

2.23.16 **Low Voltage/Low Current Wiring and Terminals**: All power and ground wiring shall conform to specification requirements of SAE Recommended Practice J1127, J1128 and J1292. Double insulation shall be maintained as close to the junction box, electrical compartment or terminals as possible. The requirement for double insulation shall be met by wrapping the harness with plastic electrical tape or by sheathing all wires and harnesses with non-conductive, rigid or flexible conduit.

2.23.16.1 Wiring shall be grouped, numbered and/or color-coded. Wiring harnesses shall not contain wires of different voltage classes unless all wires within the harness are insulated for the highest voltage present in the harness. Kinking, grounding at multiple points, stretching, and exceeding minimum bend radius shall be prevented.

2.23.16.2 Strain-relief fittings shall be provided at all points where wiring enters electrical compartments. Grommets or other protective material shall be installed at points where wiring penetrates metal structures outside of electrical enclosures. Wiring supports shall be protective and non-conductive at areas of wire contact and shall not be damaged by heat, water, solvents or chafing.

2.23.16.3 To the extent practicable, wiring shall not be located in environmentally exposed locations under the vehicle. Wiring and electrical equipment

necessarily located under the vehicle shall be insulated from water, heat, corrosion and mechanical damage. Where feasible, front to rear electrical harnesses should be installed above the window line of the vehicle.

2.23.16.4 All wiring harnesses over 5 ft. long and containing at least five wires shall include 10 percent (minimum one wire) excess wires for spares. This requirement for spare wires does not apply to data links and communication cables. Wiring harness length shall allow end terminals to be replaced twice without pulling, stretching or replacing the wire. Terminals shall be crimped to the wiring according to the connector manufacturer's recommendations for techniques and tools. All cable connectors shall be locking type, keyed and sealed, unless enclosed in watertight cabinets or vehicle interior. Pins shall be removable, crimp contact type, of the correct size and rating for the wire being terminated. Unused pin positions shall be sealed with sealing plugs. Adjacent connectors shall either use different inserts or different insert orientations to prevent incorrect connections.

2.23.16.5 Terminals shall be crimped, corrosion-resistant and full ring type or interlocking lugs with insulating ferrules. When using pressure type screw terminal strips, only stranded wire shall be used. Insulation clearance shall ensure that wires have a minimum of "visible clearance" and a maximum of two times the conductor diameter or 1/16 in., whichever is less. When using shielded or coaxial cable, upon stripping of the insulation, the metallic braid shall be free from frayed strands that can penetrate the insulation of the inner wires.

2.23.16.5.1 Ultra-sonic and T-splices may be used with 7 AWG or smaller wire. When a T-splice is used, it shall meet these additional requirements:

2.23.16.5.1.1 It shall include a mechanical clamp in addition to solder on the splice.

2.23.16.5.1.2 The wire shall support no mechanical load in the area of the splice.

2.23.16.5.1.3 The wire shall be supported to prevent flexing.

2.23.16.6 All splicing shall be staggered in the harness so that no two splices are positioned in the same location within the harness.

2.23.16.7 Wiring located in the motor compartment shall be routed away from high-heat sources or shielded and/or insulated from temperatures exceeding the wiring and connector operating requirements.

2.23.16.8 The instrument panel and wiring shall be easily accessible for service from the driver's seat or top of the panel. The instrument panel shall be separately removable and replaceable without damaging the instrument panel or gauges. Wiring shall have sufficient length and be routed to permit service without stretching or chafing the wires.

2.23.17 **Electrical Components**: All electrical components, including switches, relays, flashers and circuit breakers, shall be heavy-duty designs with either a successful history of application in heavy-duty vehicles or design specifications for an equivalent environment.

All electric motors shall be heavy-duty brushless type where practical, and have a continuous duty rating of no less than 40,000 hours (excluding washer pumps and wiper motors). All electric motors shall be easily accessible for servicing.

2.23.18 **Electrical Compartments**: All relays, controllers, flashers, circuit breakers and other electrical components shall be mounted in easily accessible electrical compartments. All compartments exposed to the outside environment shall be corrosion-resistant and sealed. The components and their functions in each electrical compartment shall be identified and their location permanently recorded on a drawing attached to the inside of the access panel or door. The drawing shall be protected from oil, grease, fuel and abrasion. The front compartment shall be completely serviceable from the driver's seat, vestibule or from the outside.

2.23.19 **High-Voltage Electrical System**: There shall be no exposed conductors, terminals, contracts or other energized parts with a high-voltage potential to any other exposed conductive material or person on the bus in normal operating charging configurations.

2.23.19.1 Non-conductive covers must prevent inadvertent human contact including service personnel working on or inside the vehicle. All HV enclosures must be finger–proof (impossible to touch an HV terminal with a finger), tool-proof (impossible to touch an HV terminal with a tool (screwdriver, wrench, etc.), and drop-proof (small (e.g. #10) nut dropped on the enclosure cannot cause a short circuit, ground fault, or other hazardous condition). HV systems and containers must be protected from moisture.

2.23.19.2 The use of a key to unlock or removal of at least one threaded fastener to open covers or panels shall be required in order to gain access to high-voltage components. The access panels or covers limiting access to high-voltage components shall be clearly labeled as such.

2.23.19.3 No single point failure of hardware, or of software, or of trained personnel to follow documented procedure shall result in an unreasonably safety risk to any person.

2.23.20 **High Voltage Disconnect System**: The high-voltage system shall be fitted with automatic disconnecting contactors located as closely as possible to the positive and negative battery output terminals so as to minimize the external circuitry that is not de-energized when the devices open. These contractors shall be in addition to any such devices incorporated in the motor controller, and shall not require electrical power to operate (that is, they shall be normally open when unpowered). The contactors shall be rated as capable of interrupting the maximum normally encountered charging or operating current at the highest voltage likely to be encountered (maximum charger-output voltage, or charger-input voltage, whichever is greater). Contactors shall be controlled by the "High Voltage Disconnect" switch, and any safety-critical interlocks and interlock loops, motor-controller overcurrent-protection functions, and vehicle crash and/or fire sensors. Reset of the contactors shall require the deliberate action of the operator or maintenance personnel. Contactors should provide a visual or electrical indication of their status (open or closed) or of a failure to function.

2.23.20.1 Lids to high voltage enclosures must be interlocked, such that opening an enclosure automatically disconnects the high voltage system. Any high voltage cable of 5 amps or greater must also have an interlock such that disconnecting any cable of this type will disconnect the high voltage system.

2.23.20.2 This feature could be part of the emergency shutdown system, providing an organized / fail safe method for shutting the high voltage system down by manual activation of an emergency switch (red palm but- ton), sensed isolation fault between high voltage and chassis, opening an interlocked panel, or disconnecting high voltage cables of 5 amps or greater.

2.23.21 **High Voltage Wiring**: High-voltage wiring shall conform in all respects to SAE recommended practices J1654 (High-voltage Primary Cable), J1673 (High-Voltage Automotive Wiring), and J1742 (High Voltage On-Board Connectors). The outer layer of insulation on high-voltage wiring shall be bright orange or yellow in color.

2.23.21.1 High-voltage wiring shall be protected from road hazards and collision damage by major structural members. Wiring shall be continuous cables with connections secured using suitable vibration resistant fasteners such as nylocks or lock washers on bolted terminals. Terminals shall be rated for the expected current, corrosion-resistant, and crimped or secured with setscrews. Wiring length shall allow replacement of end terminals without pulling, stretching, or replacing the wire. Double insulation shall be maintained as close to the terminals as practicable. Terminal shanks and cable ends shall be protected by shrink tubing or vulcanized covers. Shrink tubing or vulcanized covers shall be the color coded to indicate polarity; black to indicate terminals normally negative, red for terminals normally positive. Red or black shall not be used for protective covers of terminals on wiring normally carrying high-voltage alternating currents. All high-voltage wiring shall be durably labeled and numbered to be identical from one bus to the next.

2.23.21.2 All HV wiring that runs through areas where rotating or moving components might cause abrasion must be enclosed in orange or yellow non-conductive conduit. The conduit must be securely anchored at least at each end, and must be located out of the way of possible snagging or damage. Wiring inside of battery enclosures is not required to be covered, but must be adequately secured and protected from abrasion and mechanical stress.

2.23.21.3 All external heat sinks or metal housings for HV components (i.e. motors, inverters, etc…) must be securely grounded. Within an enclosure, exposed (un-insulated) HV terminals and conductors of opposing polarities must be spaced with an adequate air gap to prevent arcing due to dielectric breakdown. It is strongly recommended that the spacing is significantly larger than this to reduce the risk of accidental short circuit during service.

2.23.21.4 High-voltage wiring shall not be bundled with low-voltage wiring (except appropriately fused and distinctively marked high-voltage instrumentation-signal wires may be routed with other instrumentation-signal wires if the conduit or bundle is also distinctively marked as carrying high voltage). Grommets of elastomeric material shall be provided at points where wiring penetrates metal or rigid structures. Wiring supports shall be non-conductive. Precautions shall be taken to avoid damage from heat, water, solvents, commonly encountered automotive fluids, and chafing. Wire shall support no mechanical loads in the area of terminals and the wires shall be supported to prevent flexing. All wiring shall be numbered to be identical from one bus to the next.

2.23.22 **High Voltage Overcurrent Protection**: All wiring and connected devices and equipment shall be protected against overcurrents by fuses or circuit breakers. Fuses and circuit breakers shall be rated to protect against prolonged overloads and short circuit conditions. The time-current characteristics of overcurrent protective devices and functions shall minimize hazard to personnel and equipment in the event of failure of any single protective device of function.

2.23.23 **High Voltage Grounding**: The bus chassis and all conductive structural elements of the vehicle shall be electrically interconnected by means of low-resistance mechanical connections, ground straps, wires, or welded connections. Buses with a nonconductive chassis shall be provided with a low-impedance grounding system suitably sized for the level and duration of possible faults currents. Ground paths shall not exhibit an electrical potential in excess of 0.1-volt relative to each other while the bus is off or in normal operating or charging configurations. The high-voltage electrical system shall not, in any normally encountered operational or charging configuration, make use of the vehicle chassis or of the low voltage grounding system as a current path. The high-voltage electrical system shall not, in any normally encountered operation or charging configuration, induce any detectable electrical current in the vehicle chassis, in the low-voltage grounding system, or in the low-voltage electrical systems except as a design feature of instrumentation circuits.

2.23.23.1 HV and low-voltage (chassis-grounded) circuits must be physically segregated. If both HV and grounded circuits are present within an enclosure, they must be separated by insulating barriers or other moisture resistant, UL recognized insulating materials, or well separated so that there is no risk of arcing due to dielectric breakdown or contact due to slight shifting of components during use.

2.23.23.2 If hazardous voltages are contained within a conductive exterior case or enclosed that may be exposed to human contract as installed in the vehicle, such case or enclosure shall be provided with a conductive connection to the vehicle chassis or grounding system.

2.23.23.3 Energy storage components (including batteries) and major power electronics components shall have their conductive external cases connected to the vehicle chassis or grounding system by a ground strap, wire, welded connection or other suitable low resistance mechanical connection. This grounding connection shall provide a low impedance path, sized appropriately for the level and duration of possible fault currents. Ground paths shall not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), body or powerplant mountings.

2.23.23.4 Other components that receive hazardous voltages from sources outside their enclosures may have their cases grounded either directly (as above) or indirectly through the wiring harness that carries the voltage(s) from the external source. Disconnecting the wiring harness used to provide indirect case grounding shall also disconnect the source of hazardous voltages.

2.23.23.5 Loss of isolation of the high-voltage electrical system from the chassis grounding system shall cause a dashboard-warming lamp to illuminate and automatic disconnect of the high-voltage system.

2.23.24 **DC-DC Converters and DC-AC Inverters**: The buses shall be fitted with a device or controller function to maintain the low-voltage batteries at a full state-of-charge using energy drawn from the traction battery.

2.23.24.1 The high-voltage inputs to individual DC-to-AC and DC-to-DC conversion devices shall be protected by circuit breakers or fuses. The output circuits of DC-to-AC and DC-to-DC conversion devices shall also be protected by appropriately rated circuit breakers or fuses.

2.23.24.2 Verify that the charger/charge function works throughout the acceptance testing. Verify that the fuses or circuit breakers are appropriately sized by consulting the conversion devices maker's literature in the contractors engineering files.

2.23.25 **General Electronic Requirements**: If an electronic component has an internal real-time clock, it shall provide its own battery backup to monitor time when battery power is disconnected, and/or it may be updated by a network component. If an electronic component has an hour meter, it shall record accumulated service time without relying on battery backup. All electronic component Suppliers shall ensure that their equipment is self-protecting in the event of shorts in the cabling, and also in over-voltage (over 32V DC on a 24V DC nominal voltage rating with a maximum of 50V DC) and reverse polarity conditions. If an electronic component is required to interface with other components, it shall not require external pull-up and/or pull-down resistors. Where this is not possible, the use of a pull-up or pull-down resistor shall be limited as much as possible and easily accessible and labeled.

2.23.26 **Wiring and Terminals**: Kinking, grounding at multiple points, stretching and reducing the bend radius below the manufacturer's recommended minimum shall not be permitted.

2.23.27 **Discrete I/O (Inputs/Outputs)**: All wiring to I/O devices, either at the harness level or individual wires, shall be labeled, stamped or color-coded in a fashion that allows unique identification at a spacing not exceeding 4 in. Wiring for each I/O device shall be bundled together. If the I/O terminals are the same voltages, then jumpers may be used to connect the common nodes of each I/O terminal.

2.23.28 **Shielding**: All wiring that requires shielding shall meet the following minimum requirements. A shield shall be generated by connecting to a ground, which is sourced from a power distribution bus bar or chassis. A shield shall be connected at one location only, typically at one end of the cable. However certain standards or special requirements, such as SAE J1939 or RF applications, have separate shielding techniques that also shall be used as applicable. A shield grounded at both ends forms a ground loop, which can cause intermittent control or faults. When using shielded or coaxial cable, upon stripping of the insulation, the metallic braid shall be free from frayed strands, which can penetrate the insulation of the inner wires. To prevent the introduction of noise, the shield shall not be connected to the common side of a logic circuit.

2.23.29 **Communications**: The data network cabling shall be selected and installed according to the selected protocol requirements. The physical layer of all network communication systems shall not be used for any purpose other than communication between the system components, unless provided for in the network specifications. Communications networks that use power line carriers (e.g., data modulated on a 24V-power line) shall meet the most stringent applicable wiring and terminal specifications.

2.23.30 **Radio Frequency (RF)**: RF components, such as radios, video devices, cameras, global positioning systems (GPS), etc., shall use coaxial cable to carry the signal. All RF systems require special design consideration for losses along the cable. Connectors shall be

minimized, since each connector and crimp has a loss that will attribute to attenuation of the signal. Cabling should allow for the removal of antennas or attached electronics without removing the installed cable between them. If this cannot be done, then a conduit of sufficient size shall be provided for ease of attachment of antenna and cable assembly. The corresponding component vendors shall be consulted for proper application of equipment, including installation of cables.

2.23.31 **Audio**: Cabling used for microphone level and line level signals shall be 22 AWG minimum with shielded twisted pair. Cabling used for amplifier level signals shall be 18 AWG minimum.

2.23.32 **Multiplexing**: The primary purpose of the multiplexing system is control of components necessary to operate the vehicle. This is accomplished by processing information from input devices and controlling output devices through the use of an internal logic program. Versatility and future expansion shall be provided for by expandable system architecture. The multiplex system shall be capable of accepting new inputs and outputs through the addition of new modules and/or the utilization of existing spare inputs and outputs. All like components in the multiplex system shall be modular and interchangeable with self-diagnostic capabilities. The modules shall be easily accessible for troubleshooting electrical failures and performing system maintenance. Multiplex input/output modules shall use solid-state devices to provide extended service life and individual circuit protection. Ten percent of the total number of inputs and outputs, or at least one each for each voltage type utilized (0V, 12V, 24V), at each module location shall be designated as spares.

2.23.33 **System Configuration**: Multiplexing may either be distributed or centralized. A distributed system shall process information on multiple control modules within the network. A centralized system shall process the information on a single control module. Either system shall consist of several modules connected to form a control network. The multiplex supplier shall be Dinex I/O Controls, G3 system with single point interface.

2.23.34 **I/O Signals**: The input/output for the multiplex system may contain three types of electrical signals: discrete, analog or serial data. Discrete signals shall reflect the on/off status of switches, levers, limit switches, lights, etc. Analog signals shall reflect numerical data as represented by a voltage signal (0-12V, 10-24V, etc.) or current signal (4-20 mA). Both types of analog signals shall represent the status of variable devices such as rheostats, potentiometers, temperature probes, etc. Serial data signals shall reflect ASCII or alphanumeric data used in the communication between other on-board components.

2.23.35 **Data Communications**: All data communication networks shall be either in accordance with a nationally recognized interface standard, such as those published by SAE, IEEE or ISO, or shall be published to the County with the following minimum information:

2.23.35.1 Protocol requirements for all timing issues (bit, byte, packet, inter-packet timing, idle line timing, etc.) packet sizes, error checking and transport (bulk transfer of data to/from the device).

2.23.35.2 Data definition requirements that ensure access to diagnostic information and performance characteristics.

2.23.35.3 The capability and procedures for uploading new application or configuration data.

2.23.35.4 Access to revision levels of data, application software and firmware.

2.23.35.5 The capability and procedures for uploading new firmware or application software.

2.23.35.6 Evidence that applicable data shall be broadcast to the network in an efficient manner such that the overall network integrity is not compromised.

2.23.35.7 Any electronic vehicle components used on a network shall be conformance tested to the corresponding network standard.

2.23.36 **Propulsion System Level**: Propulsion system components, consisting of the electric motors, energy storage, power electronics, ABS and ATC and all other related components, shall be integrated and communicate fully with respect to vehicle operation with data using SAE Recommended Communications Protocols such as J1939 and/or J1708/J1587 with forward and backward compatibilities or other open protocols.

2.23.37 **Diagnostics, Fault Detection and Data Access**: Propulsion system performance, maintenance and diagnostic data, and other electronic messages shall be formatted and transmitted on the communications networks. The propulsion system level shall have the ability to record abnormal events in memory and provide diagnostic codes and other information to service personnel. At a minimum, this network level shall provide live/fail status, current hardware serial number, software/data revisions and uninterrupted timing functions.

2.23.38 **Programmability (Software)**: The propulsion system level components shall be programmable by the County with limitations as specified by the sub-system Supplier.

2.23.39 Data Access: At a minimum, information shall be made available via a communication port on the multiplex system. The location of the communication port shall be easily accessible. A hardware gateway and/or wireless communications system are options if requested by the County. The communication port(s) shall be located as specified by the County.

2.23.40 **Diagnostics and Fault Detection**: The multiplex system shall have a proven method of determining its status (system health and input/output status) and detecting either active (online) or inactive (offline) faults through the use of on-board visual/audible indicators. In addition to the indicators, the system shall employ an advanced diagnostic and fault detection system, which shall be accessible via either a personal computer or a handheld unit. Either unit shall have the ability to check logic function. The diagnostic data can be incorporated into the information level network or the central data access system.

2.23.41 **Programmability (Software)**: The multiplex system shall have security provisions to protect its software from unwanted changes. This shall be achieved through any or all of the following procedures:

2.23.41.1 Password protection;

2.23.41.2 Limited distribution of the configuration software;

2.23.41.3 Limited access to the programming tools required to change the software;

2.23.41.4 Hardware protection that prevents undesired changes to the software; and

2.23.41.5 Provisions for programming the multiplex system shall be possible through a PC or laptop. The multiplex system shall have proper revision

control to ensure that the hardware and software are identical on each vehicle equipped with the system. Revision control shall be provided by all of the following:

2.23.41.5.1 Hardware component identification where labels are included on all multiplex hardware to identify components.

2.23.41.5.2 Hardware series identification where all multiplex hardware displays the current hardware serial number and firmware revision employed by the module.

2.23.41.5.3 Software revision identification where all copies of the software in service displays the most recent revision number.

2.23.41.5.4 A method of determining which version of the software is currently in use in the multiplex system.

2.23.41.5.5 Revision control labels shall be electronic.

2.23.42 **Electronic Noise Control**: Electrical and electronic sub-systems and components on all buses shall not emit electromagnetic radiation that will interfere with on-board systems, components or equipment, telephone service, radio or TV reception or violate regulations of the Federal Communications Commission. Electrical and electronic sub-systems on the coaches shall not be affected by external sources of RFI/EMI. This includes, but is not limited to, radio and TV transmission, portable electronic devices including computers in the vicinity of or onboard the buses, ac or dc power lines and RFI/EMI emissions from other vehicles.

2.24 **Driver Provisions, Controls And Instrumentation**:

2.24.1 **Driver's Area Controls**: In general when designing the driver's area, it is recommended that SAE J833, "Human Physical Dimensions," be used. Switches and controls shall be divided into basic groups and assigned to specific areas, in conformance with SAE Recommended Practice J680, Revised 1988, "Location and Operation of Instruments and Controls in Motor Truck Cabs," and be essentially within the hand reach envelope described in SAE Recommended Practice J287, "Driver Hand Control Reach."

2.24.2 **Glare**: The driver's work area shall be designed to minimize glare to the extent possible. Objects within and adjacent to this area shall be matte black or dark gray in color wherever possible to reduce the reflection of light onto the windshield. The use of polished metal and light-colored surfaces within and adjacent to the driver's area shall be avoided.

2.24.3 **Visors/Sun Shades**: An adjustable roller type sunscreen, with half solid and half mesh, shall be provided over the driver's windshield and the driver's side window. The split shall be vertical on the side window shade for a high mounted side mirror. The sunscreen shall be capable of being lowered to the midpoint of the driver's window. When deployed, the screen shall be secure, stable and shall not rattle, sway or intrude into the driver's field of view due to the motion of the coach or as a result of air movement. Once lowered, the screen shall remain in the lowered position until returned to the stowed position by the driver. Sunscreen shall be shaped to minimize light leakage between the visor and windshield pillars to the extent possible.

2.24.4 **Driver's Controls**: Frequently used controls must be in easily accessible locations. These include the door control, kneel control, windshield wiper/washer controls, ramp, and lift

and run switch. Any switches and controls necessary for the safe operation of the bus shall be conveniently located and shall provide for ease of operation. They shall be identifiable by shape, touch and permanent markings. Controls also shall be located so that passengers may not easily tamper with control settings.

2.24.4.1 All panel-mounted switches and controls shall be marked with easily read identifiers. Graphic symbols shall conform to SAE Recommended Practice J2402, "Road Vehicles – Symbols For Controls, Indicators, and Tell Tales," where available and applicable. Color of switches and controls shall be dark with contrasting typography or symbols.

2.24.4.2 Mechanical switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from a convenient location. Switches, controls and instruments shall be dust and water resistant.

2.24.5 **Normal Bus Operation Instrumentation and Controls**: The following list identifies bus controls used to operate the bus. These controls are either frequently used or critical to the operation of the bus. They shall be located within easy reach of the operator. The operator shall not be required to stand or turn to view or actuate these controls unless specified otherwise.

2.24.5.1 Systems or components monitored by onboard diagnostics system shall be displayed in clear view of the operator and provide visual and/or audible indicators. The intensity of indicators shall permit easy determination of on/off status in bright sunlight but shall not cause a distraction or visibility problem at night. All indicators shall be illuminated using backlighting or by LED indicators on the dash.

2.24.5.2 The indicator panel shall be located in Area 1 or Area 5, within easy view of the operator instrument panel. All indicators shall have a method of momentarily testing their operation. The audible alarm shall be tamper-resistant and shall have an outlet level between 80 and 83 dBA when measured at the location of the operator's ear.

2.24.5.3 On-board displays visible to the operator shall be limited to indicating the status of those functions described herein that are necessary for the operation of the bus. All other indicators needed for diagnostics and their related interface hardware shall be concealed and protected from unauthorized access. Table 3 represents instruments and alarms. The intent of the overall physical layout of the indicators shall be in a logical grouping of systems and severity nature of the fault.

2.24.5.4 Consideration shall be provided for future additions of spare indicators as the capability of onboard diagnostic systems improves. Blank spaces shall contain LEDs.

TABLE 6
Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
Master run switch	Rotary, four-position detent	Side console	Master control for bus off, day run, night run and clearance ID lights	
Drive selector	Touch panel switch	Side console	Provides selection of propulsion: forward, reverse and neutral	Gear selection
HVAC	Switch or switches to control HVAC	Side console	Permits selection of passenger ventilation: off, cool, heat, low fan, high fan or full auto with on/off only	
Driver's ventilation	Rotary, three-position detent	Side console or Dash left wing	Permits supplemental ventilation: fan off, low or high	
Defroster fan	Rotary, three-position detent	Side console or Dash left wing	Permits defroster: fan off, low, medium or high	
Defroster temperature	Variable position	Side console or Dash left wing	Adjusts defroster water flow and temperature	
Windshield wiper	One-variable rotary position operating both wipers	Dash left wing	Variable speed control of left and right windshield wipers	
Windshield washer	Push button	Dash left wing	Activates windshield washers	

Device	Description	Location	Function	Visual/ Audible
Dash panel lights	Rotary rheostat or stepping switch	Side Console or Dash left wing	Provides adjustment for light intensity in night run position	
Interior lights	Three-position switch	Side console	Selects mode of passenger compartment lighting: off, on, normal	
WC ramp/ kneel enable	Two-position switch[1]	Side console or Dash right wing	Permits operation of ramp and kneel operations at each door remote panel	Amber light
Front door ramp/kneel enable	Two-position keyed switch[1]	Front door remote or Dash right wing	Permits ramp and kneel activation from front door area, key required[1]	Amber light
Front door ramp	Three-position momentary switch	Right side of steering wheel	Permits deploy and stow of front ramp	Red light
Front kneel	Three-position momentary switch	Front door remote	Permits kneeling activation and raise and normal at front door remote location	Amber or red dash indicator. Ext alarm and Amber light
Silent alarm	Recessed push button, NO and NC contacts momentary	Left side of steering wheel	Activates emergency radio alarm at dispatch and permits covert microphone and/or enables destination sign emergency message	
Video system event switch	Momentary on/off momentary switch with plastic guard	Side console	Triggers event equipment, triggers event light on dash	Amber light

Device	Description	Location	Function	Visual/ Audible
Left remote mirror	Four-position toggle type	Side console	Permits two-axis adjustment of left exterior mirror	
Right remote mirror	Four-position toggle type	Side console	Permits two-axis adjustment of right exterior mirror	
Passenger door control	Five-position handle type detent or two momentary push buttons	Side console, forward	Permits open/close control of front and rear passenger doors	Red light
Motor shutdown override	Momentary switch with operation protection	Side console	Permits driver to override auto motor shutdown	
Hazard flashers	Two-position switch	Side console or Dash right wing	Activates emergency flashers	Two green lights
Fire suppression	Red push button with protective cover	Dash left wing or dash center	Permits driver to override and manually discharge fire suppression system	Red light
Mobile data terminal	Mobile data terminal coach operator interface panel	Above right dash wing	Facilitates driver interaction with communication system and master log-on	LCD display with visual status and text messages
Destination sign interface	Destination sign interface panel	In approved location	Facilitates driver interaction with destination sign system, manual entry	LCD display
Turn signals	Momentary push button (two required) raised from other switches	Left foot panel	Activates left and right turn signals	Two green lights and optional audible indicator

Device	Description	Location	Function	Visual/ Audible
PA manual	Momentary push button	In approved location	Permits driver to manually activate public address microphone	
Low profile microphone	Low-profile discrete Mounting	Steering column	Permits driver to make announcements with both hands on the wheel and focusing on road conditions	
High beam	Detented push button	In approved location	Permits driver to toggle between low and high beam	Blue light
Parking brake	Pneumatic PPV	Side console or Dash left wing	Permits driver to apply and release parking brake	Red light
Hill holder	Two-position momentary switch	Side console	Applies brakes to prevent bus from rolling	
Master door/ interlock	Multi-pole toggle, detented	Out of operator's reach	Permits driver override to disable door and brake/throttle interlock	Red light
Warning interlocks deactivated	Red indicator light	Dash panel center	Illuminates to warn drive that interlocks have been deactivated	Red light
Alarm acknowledge	Push button momentary	Approved location	Permits driver to acknowledge alarm condition	
Rear door passenger sensor disable	Multi-pole toggle, detented	In sign compartment or Driver's barrier compartment	Permits driver to override rear door passenger sensing system	

Device	Description	Location	Function	Visual/ Audible
Indicator/ alarm test button	Momentary switch or programming[1]	Dash center panel	Permits driver to activate test of sentry, indicators and audible alarms	All visuals and audibles
Speedometer	Speedometer, odometer, and diagnostic capability, 5-mile increments, to include programmable Trip A / B functionality	Dash center panel	Visual indication of speed and distance traveled, accumulated vehicle mileage, fault condition display	Visual
Air pressure gauge	Primary, and secondary,5 psi increments	Dash center panel	Visual indication of primary and secondary air systems	Red light and buzzer
Fire detection	Coach operator display	Property specific or dash center	Indication of fire detection activation by zone/location	Buzzer and red light
Door obstruction	Sensing of door obstruction	Dash center	Indication of rear door sensitive edge activation	Red light and buzzer
Door ajar	Door not properly closed	Property specific or dash center	Indication of rear door not properly closed	Buzzer or alarm and red light
Low system air pressure	Sensing low primary and secondary air tank pressure	Dash center	Indication of low air system pressure	Buzzer and red light
Combustible Gas detection	Indication of 50% LFL	Property specific or dash center	Detects levels of combustible gas	Solid red at 50% LFL

Device	Description	Location	Function	Visual/ Audible
Coolant Indicator	Low coolant indicator may be supplied as audible alert and visual and/or text message	Within driver's sight	Detects low coolant condition	Amber light
High Coolant temperature indicator	Coolant temperature indicator may be supplied as audible alert and visual and/or text message	Within driver's sight	Detects high coolant temperature condition and initiates time delay shutdown	Red light
ABS indicator	Detects system status	Dash center	Displays system failure	Amber light
HVAC indicator	Detects system status	Dash center	Displays system failure	Amber or red light
Charging system indicator (12/24 V)	Detect charging system status	Dash center	Detects no charge condition and optionally detects battery high, low, imbalance, no charge condition, and initiates time- delayed shutdown	Red light flashing or solid based on condition
SOC	Digital or Analog gauge	Dash center	Indication of Energy Storage System State of Charge, percentage	
Low SOC level indicator	Low SOC indicator and alert	Dash Center	Detects low energy storage SOC and alerts driver to recharge	Red or amber indicator and warning tone
Air Compressor over-temperature indicator	High air compressor temperature indicator as visual alert	Within driver's sight	Detects high temperature in air compressor or air compressor motor and alerts driver	Red indicator

Device	Description	Location	Function	Visual/ Audible
Derate active indicator	Control system has derated powertrain power indicator as visual alert lights.	Within driver's sight	Notifies driver control system has initiated derate to protect components	Red indicator
Transmission failure detected indicator	Controls system has detected a transmission failure indicator as visual alert	Within driver's sight	Notifies driver transmission failure has been detected	Red indicator
Traction motor failure detected indicator	Controls system has detected a traction motor failure indicator as visual alert	Within driver's sight	Notifies driver traction motor failure has been detected	Red indicator
High voltage ground fault detected indicator	Controls system has detected a ground fault indicator as visual alert	Within driver's sight	Notifies driver that ground fault has been detected	Red indicator
Light/bulb failure detected indicator	Controls system has detected an open circuit (bulb failure) indicator as visual alert	Within driver's sight	Notifies driver that a light/bulb failure has been detected	Amber indicator
Wheelchair stop requested indicator	Stop request in wheelchair area has been requested visual alert	Within driver's sight	Notifies driver that stop request requiring wheelchair assist has been requested	Blue indicator

1. Indicate area by drawing. Break up switches control from indicator lights.

2.24.6 **Driver Foot Controls**: Accelerator and brake pedals shall be designed for ankle motion. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material.

2.24.7 **Pedal Angle**: The vertical angle of the accelerator and brake pedals shall be determined from a horizontal plane regardless of the slope of the cab floor. The accelerator and brake pedals shall be positioned at an angle of 37 to 50 degrees at the point of initiation of contact and extend downward to an angle of 10 to 18 degrees at full throttle. The location of the brake and accelerator pedals shall be determined by the manufacturer, based on space needs, visibility, lower edge of windshield, and vertical H-point.

2.24.8 **Pedal Dimensions and Position**: The floor-mounted accelerator pedal shall be 9.75 to 12 in. long and 3 to 4 in. wide. Clearance around the pedal must allow for no interference precluding operation. The accelerator and brake pedals shall be positioned such that the spacing between them, measured at the heel of the pedals, is between 1 and 2 in. Both pedals should be located approximately on the same plane coincident to the surface of the pedals.

2.24.9 **Brake and Accelerator Pedals**: Both pedals shall be adjustable forward and rearward a minimum of 3 in. The adjustment shall be made by use of a dash-mounted toggle or rocker switch. The switch shall be clearly labeled to identify it as pedal adjustment and shall be within easy reach of the driver. Pedal adjustment shall be enabled only when the bus is stationary and the parking brake engaged.

2.24.10 **Driver Floor-Mounted Foot Control Platform**: The angle of the turn signal platform shall be determined from a horizontal plane, regardless of the slope of the cab floor. The turn signal platform shall be angled at a minimum of 10 degrees and a maximum of 37 degrees. It shall be located no closer to the seat front than the heel point of the accelerator pedal.

2.24.11 **Turn Signal Controls**: Turn signal controls shall be floor-mounted, foot-controlled, water-resistant, heavy-duty, momentary contact switches.

2.24.12 **Foot Switch Control**: The control switches for the turn signals shall be mounted on an inclined, floor-mounted stainless steel enclosure or metal plate mounted to an incline integrated into the driver's platform, located to the left of the steering column. The location and design of this enclosure shall be such that foot room for the operator is not impeded. The inclined mounting surface shall be skid-resistant. All other signals, including high beam and public address system shall be in approved location. The foot switches shall be UL-listed, heavy-duty type, of a rugged, corrosion-resistant metal construction. The foot switches for the directionals shall be momentary type, while those for the PA system and the high beam shall be latching type. The spacing of the switches shall be such that inadvertent simultaneous deflection of switches is prevented.

2.24.13 **Driver Coat Hanger**: A suitable hanger with strap shall be installed in a convenient, approved location for the driver's coat.

2.24.14 **Driver Storage Box**: An enclosed driver storage area shall be provided with a positive latching door and/or lock. The minimum size is 2100 cubic in.

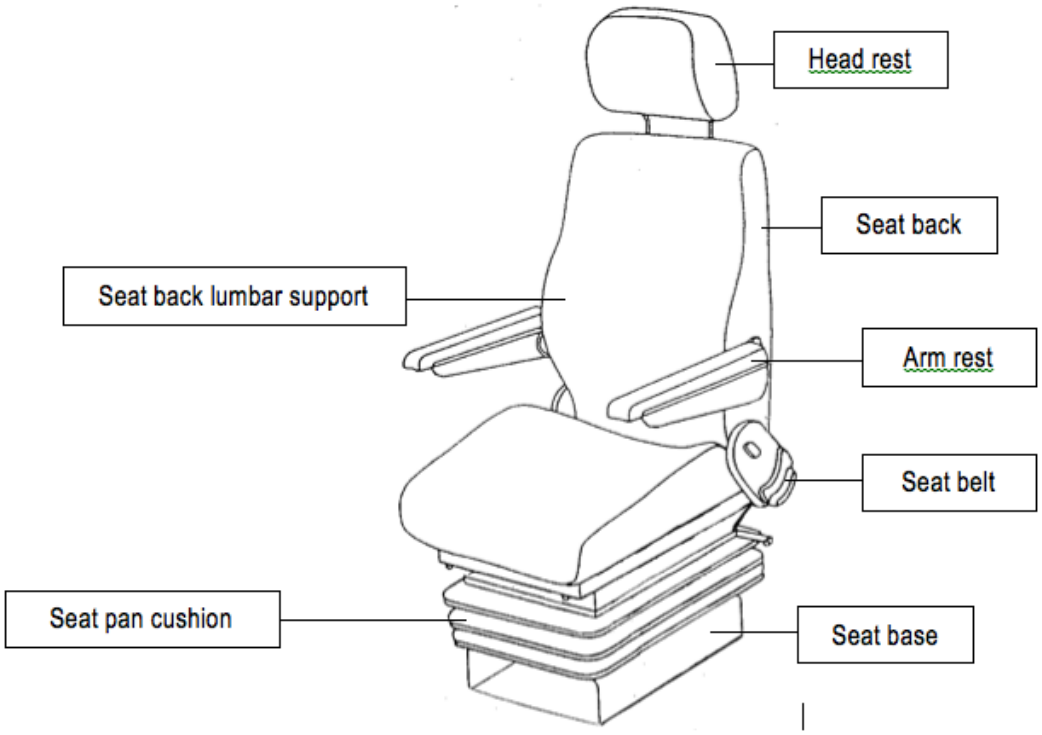
2.24.15 **Windshield Wipers**: The bus shall be equipped with a windshield wiper for each half of the windshield. At 60 mph, no more than 10 percent of the wiped area shall be lost due to windshield wiper lift. For two- piece windshields, both wipers shall park along the center edges of the windshield glass. For single-piece windshields, wipers shall park along the bottom edge of the windshield. Windshield wiper motors and mechanisms shall be easily accessible for repairs or service. The fastener that secures the wiper arm to the drive mechanism shall be corrosion-resistant. Switch shall be a single-control, electric two-

speed intermittent wiper. A variable-speed feature shall be provided to allow adjustment of wiper speed between approximately five(5) and twenty-five (25) cycles per minute.

2.24.16 **Windshield Washers**: The windshield washer system, when used with the wipers, shall deposit washing fluid evenly and completely wet the entire wiped area. The windshield washer system shall have a minimum 2-gallon reservoir, located for easy refilling from outside of the bus. Reservoir pumps, lines and fittings shall be corrosion-resistant and must include a means to determine fluid level.

2.24.17 **Driver's Seat**:

FIGURE 6
Driver's Seat



2.24.17.1 **Dimensions**: The driver's seat shall be comfortable and adjustable so that people ranging in size from a 95th-percentile male to a 5th-percentile female may operate the bus.

2.24.17.2 **Seat Pan Cushion Length**: Measurement shall be from the front edge of the seat pan to the rear at its intersection with the seat back. The adjustment of the seat pan length shall be no less than 16.5 in. at its minimum length and no more than 20.5 in. at its maximum length.

2.24.17.3 **Seat Pan Cushion Height**: Measurement shall be from the cab floor to the top of the level seat at its center midpoint. The seat shall adjust in height from a minimum of 14 in., with a minimum 6 in. vertical range of adjustment.

2.24.17.4 **Seat Pan Cushion Slope**: Measurement is the slope of the plane created by connecting the two high points of the seat, one at the rear of the seat at its intersection with the seat back and the other at the front of the seat just before it waterfalls downward at the edge. The slope can be measured using an inclinometer and shall be stated in degrees of incline relative to the horizontal plane (0 degrees). The seat pan shall adjust in its slope from no less than plus 12 degrees (rearward "bucket seat" incline), to no less than minus 5 degrees (forward slope).

2.24.17.5 **Seat Base Fore/Aft Adjustment**: Measurement is the horizontal distance from the heel point to the front edge of the seat. The minimum and maximum distances shall be measured from the front edge of the seat when it is adjusted to its minimum seat pan depth (approximately 15 in.). On all low-floor buses, the seat-base shall travel horizontally a minimum of 9 in. It shall adjust no closer to the heel point than 6 in. On all high-floor buses, the seat base shall travel a minimum of 9 in. and adjust no closer to the heel-point than 6 in.

2.24.17.6 **Seat Pan Cushion Width**: Measurement is the horizontal distance across the seat cushion. The seat pan cushion shall be 17 to 21 in. across at the front edge of the seat cushion and 20 to 23 in. across at the side bolsters.

2.24.17.7 **Seat Suspension**: The driver's seat shall be appropriately dampened to support a minimum weight of 380 lbs. The suspension shall be capable of dampening adjustment in both directions. Rubber snubbers shall be provided to prevent metal-to-metal contact.

2.24.17.8 **Seat Back Width**: Measurement is the distance between the outermost points of the front of the seat back, at or near its midpoint in height. The seat back width shall be no less than 19 in. Seat back will include dual recliner gears on both sides of the seat.

2.24.17.9 **Seat Height**: Seat shall have standard height seat back.

2.24.17.10 **Seat Headrests**: Seat shall have an adjustable headrest.

2.24.17.11 **Seat Back Lumbar Support**: Measurement is from the bottom of the seat back at its intersection with the seat pan to the top of the lumbar cushioning. The seat back shall provide adjustable depth lumbar back

support with three individual operating lumbar cells within a minimum range of 7 to 11 in.

2.24.17.12 **Seat Back Angle Adjustment**: The seat back angle shall be measured relative to a level seat pan, where 90 degrees is the upright position and 90 degrees-plus represents the amount of recline. The seat back shall adjust in angle from a minimum of no more than 90 degrees (upright) to at least 105 degrees (reclined), with infinite adjustment in between.

2.24.17.13 **Seat Belt**: The belt assembly should be an auto-locking retractor (ALR). All seat belts should be stored in automatic retractors. The belts shall be mounted to the seat frame so that the driver may adjust the seat without resetting the seat belt. The seat and seat belt assemblies as installed in the bus shall withstand static horizontal forces as required in FMVSS 207 and 210. Seat belts shall be provided across the driver's lap and diagonally across the driver's chest. The driver shall be able to use both belts by connecting a single buckle on the right side of the seat cushion. 3-pt seatbelts must be emergency locking retractor (ELR) in design. Seatbelt webbing shall be black in color.

2.24.17.14 **Adjustable Armrest** – Seat shall not have armrests.

2.24.17.15 **Seat Control Locations**: While seated, the driver shall be able to make seat adjustments by hand without complexity, excessive effort or being pinched. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes.

2.24.17.16 **Seat Structure and Materials**: Cushions shall be fully padded with at least 3 in. of materials in the seating areas at the bottom and back. Cushion material will be closed-cell polyurethane (FMVSS 302).

2.24.17.17 **Pedestal**: Pedestal will be stainless steel.

2.24.17.18 **Seat Options**: The seat shall be a Recaro Ergo Metro with the following options:

2.24.17.18.1 Slide length of 9" minimum
2.24.17.18.2 Shoulder belt
2.24.17.18.3 Vinyl headrest
2.24.17.18.4 ABS back panel
2.24.17.18.5 Air lumbar
2.24.17.18.6 Black fabric w/vinyl boxing

2.24.18 **Exterior Mirrors**: The bus shall be equipped with a corrosion-resistant, outside rearview mirrors mounted with stable supports to minimize vibration. Mirrors shall be firmly attached to the bus to minimize vibration and to prevent loss of adjustment with a breakaway mounting system. Mirrors shall permit the driver to view the roadway along the sides of the bus, including the rear wheels. Mirrors should be positioned to prevent blind spots. Mirrors shall retract or fold sufficiently to allow bus washing operations but avoid contact with windshield. The mirrors shall be a combination of flat and convex mirrors referred to as transit-specific.

2.24.18.1 Both the street-side and curb-side mirrors shall have heaters that energize whenever the driver's heater and/or defroster is activated, or can be activated independently.

2.24.18.2 The curbside rearview mirror shall be mounted so that its lower edge is no less than 80 in. above the street surface. A lower mount may be required due to requested mirror configuration requests.

2.24.18.3 The driver shall be able to adjust the curbside mirror remotely while seated in the driving position. The control for remote positioning of the mirror shall be a single switch or device.

2.24.18.4 The driver shall be able to adjust the street-side mirror remotely while seated in the driving position. The control for remote positioning of the mirror shall be a single switch or device.

2.24.18.5 Mirrors shall be B&R, or Approved Equal, 10 x 11 inch flat and convex, minimum, with remote for both glazings. The arms shall be cast aluminum with integral connectors. Both curbside and streetside mirrors shall be top mounted.

2.24.19 **Interior Mirrors**: Mirrors shall be provided for the driver to observe passengers throughout the bus without leaving the seat and without shoulder movement. The driver shall be able to observe passengers in the front/entrance and rear/exit areas, anywhere in the aisle, and in the rear seats. The following mirrors are required as a minimum:

2.24.19.1 8" x 16" rearview mirror
2.24.19.2 6" round on door header
2.24.19.3 12" convex at rear exit door

2.25 **Windows**: A minimum of 8000 sq. in. of window area, including operator and door windows, shall be required on each side of the standard configuration bus.

2.25.1 **Windshield**: The windshield shall permit an operator's field of view as referenced in SAE Recommended Practice J1050. The vertically upward view shall be a minimum of 14 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 3 ½ feet high no more than 2 feet in front of the bus. The horizontal view shall be a minimum of 90 degrees above the line of sight. Any binocular obscuration due to a center divider does not exceed a 3-degree angle in the operator's field of view. Windshield pillars shall not exceed 10 degrees of binocular obscuration. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the bus. The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshields shall not be used. Winglets may be bonded.

2.25.2 **Glazing**: The windshield glazing material shall have a ¼ in. nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 1A and the Recommended Practices defined in SAE J673. The upper portion of the windshield above the driver's field of view shall have a dark, shaded band with a minimum luminous transmittance of 5 percent when tested in accordance to ASTM D - 1003, unless prohibited by design of the vehicle. Two-piece windshield is preferred.

2.25.3 **Destination Sign Glass**: The destination sign glazing material shall have a ¼ in. nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 1A and the Recommended Practices defined in SAE J673. There shall be no tinting of this glass. The glass shall have an electric grid for defrosting the glazing.

2.25.4 **Driver's Side Window**: The driver's side window shall be a hidden frame (flush "Euro-look"), full sliding type requiring only the rear half of sash to latch upon closing, and shall open sufficiently to permit the seated operator to easily adjust the street-side outside rearview mirror. When in an open position, the window shall not rattle or close during braking. This window section shall slide in tracks or channels designed to last the service life of the bus. The operator's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall have a single-density tint.

2.25.4.1 The driver's view, perpendicular through operator's side window glazing, should extend a minimum of 33 in. (840 mm) to the rear of the heel point on the accelerator, and in any case must accommodate a 95th percentile male operator. The view through the glazing at the front of the assembly should begin not more than 26 in. (560 mm) above the operator's floor to ensure visibility of an under-mounted convex mirror. Driver's window construction shall maximize ability for full opening of the window.

2.25.4.2 The driver's side window glazing material shall have a ¼ in. nominal thickness laminated safety glass or tempered safety glass conforming with the requirements of ANSI Z26.1-1996 Test Grouping 2 and the Recommended Practices defined in SAE J673.

2.25.4.3 The design shall prevent sections from freezing closed in the winter. Light transmittance shall be 75 percent on the glass area below 53 in. from the operator platform floor. On the top fixed over bottom slider configuration, the top fixed area above 53 in. may have a maximum 5 percent light transmittance.

2.25.5 **Side Windows Configuration**: Side windows shall not be bonded in place, but shall be easily replaceable without disturbing adjacent windows and shall be mounted so that flexing or vibration from engine operation or normal road excitation is not apparent. All aluminum and steel material will be treated to prevent corrosion. Features shall include:

2.25.5.1 Side windows shall be AROW (Stormtite), with bonded frames
2.25.5.2 Hidden frame (flush "Euro-look")
2.25.5.3 Fixed lower panes with upper transom, tip-in

2.25.6 **Emergency Exit (Egress) Configuration**: All side windows shall be fixed in position, except as necessary to meet the emergency escape requirements.

2.25.7 **Safety Glass Glazing Panels**: Side windows glazing material shall have a minimum of 3/16 in. (5mm) nominal thickness tempered safety glass. The material shall conform to the requirements of ANSI Z26.1-1996 Test Grouping 2 and the Recommended Practices defined in SAE J673.

2.25.8 **Anti-Vandalism Sacrificial Liner ("Quick Change")**: All glazing material aft of the rear door shall be equipped with necessary bracketry, fasteners and clear acrylic liner that shall be easily removable in the event of vandalism. The acrylic liner shall be clear and shall have minimal effect on the transmittance of the underlying glazing. This material shall not be adversely affected by ultraviolet rays and shall withstand normal cleaning practices. The installation of the liner shall prevent clouding or fogging. This acrylic sacrificial liner must be replaced without removing the window from its installed position on the bus, without removing the tempered glazing from the sash, and without the removal or manipulation of the window assembly's rubber molding. A mechanic shall be able to easily remove and replace the acrylic liner without the use of any specialized tools in 5 minutes or less.

2.25.8.1 Windows on the bus sides and in the rear door shall be tinted a neutral color, complementary to the bus exterior. The maximum solar energy transmittance shall not exceed 55 percent, as measured by ASTM E-424. Luminous transmittance shall be 44 percent, as measured by ASTM D-1003. Windows over the destination signs shall not be tinted.

2.25.8.2 Windows shall be Stormtite w/hidden/bonded frames.

2.26 **Heating, Ventilating And Air Conditioning**:

2.26.1 **Capacity and Performance**: The HVAC climate control system shall be capable of controlling the temperature and maintaining the humidity levels of the interior of the bus as defined in the following paragraphs. HVAC shall be ThermoKing, or approved equal, full electric.

2.26.1.1 The HVAC unit will be roof mounted.

2.26.1.2 Fully AC high-voltage electric-driven A/C system with full hermetic AC compressor, condenser fan and evaporator blower motors.

2.26.1.3 The County anticipates the ambient temperature range for vehicle operation will be between 10°F and 95°F. With the bus running at the design operating profile with corresponding door opening cycle, and carrying a number of passengers equal to 150 percent of the seated load, the HVAC system shall control the average passenger compartment temperature within a range between 65 and 75 °F, while maintaining the relative humidity to a value of 50 percent or less. The system shall maintain these conditions while subjected to any outside ambient temperatures within a range of 10 to 95 °F and at any ambient relative humidity levels between 5 and 50 percent.

2.26.1.4 When the bus is operated in outside ambient temperatures of 95 to 115 °F, the interior temperature of the bus shall be permitted to rise 0.5° for each degree of exterior temperature in excess of 95 °F.

2.26.1.5 When bus is operated in outside ambient temperatures in the range of -10 to 10 °F, the interior temperature of the bus shall not fall below 55 °F while the bus is running on the design operating profile.

2.26.1.6 System capacity testing, including pull-down/warm-up, stabilization and profile, shall be conducted in accordance to the APTA's "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System."

2.26.1.7 The recommended locations of temperature probes are only guidelines and may require slight modifications to address actual bus design. Care must be taken to avoid placement of sensing devices in the immediate path of an air duct outlet. In general, the locations are intended to accurately represent the interior passenger area.

2.26.1.8 The air-conditioning portion of the HVAC system shall be capable of reducing the passenger compartment temperature from 110 to 90 °F in less than 20 minutes. During the cool-down period, the refrigerant pressure shall not exceed safe high-side pressures, and the condenser discharge air temperature, measured 6 in. from the surface of the coil, shall be less than 45 °F above the condenser inlet air temperature. The appropriate solar

load as recommended in the APTA "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System," representing 4 p.m. on August 21, shall be used. There shall be no passengers on board, and the doors and windows shall be closed. The air conditioning system shall meet these performance requirements using R134a.

2.26.1.9 **Controls and Temperature Uniformity**: The HVAC system excluding the driver's heater/defroster shall be centrally controlled with an advanced electronic/diagnostic control system with provisions for extracting/reading data. The system shall be compliant with J1939 Communication Protocol for receiving and broadcasting of data.

2.26.1.10 Hot propulsion system coolant water shall be delivered to the HVAC system driver's defroster/heater and other heater cores by means of an auxiliary coolant pump, sized for the required flow, which is brushless and sealless having a minimum maintenance free service life for both the brushless motor and the pump of at least 40,000 hours at full power. If coolant water is not used in propulsion cooling, then Contractor shall describe the alternative method used for providing heat.

2.26.1.11 After manual selection and/or activation of climate control system operation mode, all interior climate control system requirements for the selected mode shall be attained automatically to within ±2 °F of specified temperature control set-point.

2.26.1.12 Interior temperature distribution shall be uniform to the extent practicable to prevent hot and/or cold spots. After stabilization with doors closed, the temperatures between any two points in the passenger compartment in the same vertical plane, and 6 to 72 in. above the floor, shall not vary by more than 5 °F with doors closed. The interior temperatures, measured at the same height above the floor, shall not vary more than ± 5 °F from the front to the rear from the average temperature determined in accordance with APTA's "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System." Variations of greater than +- 5 F will be allowed for limited, localized areas provided the majority of the measured temperatures fall within the specified required.

2.26.2 **Air Flow**:

2.26.2.1 **Passenger Area**: The cooling mode of the interior climate control system shall introduce air into the bus at or near the ceiling height at a minimum rate of 25 cubic ft. per minute (cfm) per passenger based on the standard configuration bus carrying a number of passengers equal to 150 percent of the seated load. Airflow shall be evenly distributed throughout the bus, with air velocity not exceeding 100 ft. per minute on any passenger. The ventilating mode shall provide air at a minimum flow rate of 20 cfm per passenger.

2.26.2.1.1 Airflow may be reduced to 15 cfm per passenger (150 percent of seated load) when operating in the heating mode. The fans shall not activate until the heating element has warmed sufficiently to ensure at least 70 °F air outlet temperature. The heating air outlet temperature shall not exceed 120 °F under any normal operating conditions.

2.26.2.1.2 The climate control blower motors and fan shall be designed such that their operation complies with the interior noise level requirements.

2.26.2.2 **Driver's Area**: The bus interior climate control system shall deliver at least 100 cfm of air to the driver's area when operating in the ventilating and cooling modes. Adjustable nozzles shall permit variable distribution or shutdown of the airflow. Airflow in the heating mode shall be reduced proportionally to the reduction of airflow into the passenger area. The windshield defroster unit shall meet the requirements of SAE Recommended Practice J382, "Windshield Defrosting Systems Performance Requirements," and shall have the capability of diverting heated air to the driver's feet and legs. The defroster or interior climate control system shall maintain visibility through the driver's side window.

2.26.2.3 **Controls for the Climate Control System (CCS)**: The controls for the driver's compartment for heating, ventilation and cooling systems shall be integrated and shall meet the following requirements:

2.26.2.3.1 The heat/defrost system fan shall be controlled by a separate switch that has an "off" position and at least two positions for speed control. All switches and controls shall preclude the possibility of clothing becoming entangled, and shields shall be provided, if required. If the fans are approved by the County, an "on-off" switch shall be located to the right of or near the main defroster switch.

2.26.2.3.2 A manually operated control valve shall control the coolant flow through the heater core.

2.26.2.3.3 If a cable-operated manual control valve is used, the cable length shall be kept to a minimum to reduce cable seizing. Heater water control valves shall be "positive" type, closed or open. The method of operating remote valves shall require the concurrence of the County project manager.

2.26.3 **Driver's Compartment Requirements**: A separate heating, ventilation and defroster system for the driver's area shall be provided and shall be controlled by the driver. The system shall meet the following requirements:

2.26.3.1 The heater and defroster system shall provide heating for the driver and heated air to completely defrost and defog the windshield, driver's side window, and the front door glasses in all operating conditions. Fan(s) shall be able to draw air from the bus body interior and/or the exterior through a control device and pass it through the heater core to the defroster system and over the driver's feet. A minimum capacity of 100 cfm shall be provided. The driver shall have complete control of the heat and fresh airflow for the driver's area**.**

2.26.3.2 The defroster supply outlets shall be located at the lower edge of the windshield. These outlets shall be durable and shall be free of sharp edges that can catch clothes during normal daily cleaning. The system shall be such that foreign objects such as coins or tickets

cannot fall into the defroster air outlets. Adjustable ball vents or louvers shall be provided at the left of the driver's position to allow direction of air onto the side windows.

2.26.3.3 A ventilation system shall be provided to ensure driver comfort and shall be capable of providing fresh air in both the foot and head areas. Vents shall be controllable by the driver from the normal driving position. Decals shall be provided, indicating "operating instructions" and "open" and "closed" positions. When closed, vents shall be sealed to prevent the migration of water or air into the bus.

2.26.3.4 If air is provided directly to the driver ducted from the main evaporator outlet, a Heating/Cooling Test Report must be provided to demonstrate that the system as proposed meets the requirements in this section.

2.26.4 **Driver's Cooling**: No dedicated evaporator. A separate fan unit shall provide 100 cfm of air to the driver's area through directionally adjustable nozzles and an infinitely variable fan control, both of which shall be located above and ahead of the driver**.**

2.26.5 **Air Filtration**: Air shall be filtered before discharge into the passenger compartment. The filter shall meet the ANSI/ASHRAE 52.1 requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 g per 1000 cfm cell. Air filters shall be easily removable for service. Air filters shall be of disposable type.

2.26.6 **Roof Ventilators**: Two roof ventilators shall be provided in the roof of the bus with instruction in both English and Spanish. Two roof ventilators are required. The ventilator shall be easily opened and closed manually. When open with the bus in motion, this ventilator shall provide fresh air inside the bus. The ventilator shall cover an opening area no less than 425 sq. in. and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 in., or with all four edges raised simultaneously to a height of no less than 3½ in. An escape hatch shall be incorporated into the roof ventilator. Roof ventilator(s) shall be sealed to prevent entry of water when closed.

2.26.7 **Maintainability**: Manually controlled shut-off valves in the refrigerant lines shall allow isolation of the compressor and dehydrator filter for service. To the extent practicable, self-sealing couplings utilizing O-ring seals shall be used to break and seal the refrigerant lines during removal of major components, such as the refrigerant compressor. Shut-off valves may be provided in lieu of self-sealing couplings. The condenser shall be located to efficiently transfer heat to the atmosphere and shall not ingest air warmed above the ambient temperature by the bus mechanical equipment, or to discharge air into any other system of the bus. The location of the condenser shall preclude its obstruction by wheel splash, road dirt or debris. HVAC components located within 6 in. of floor level shall be constructed to resist damage and corrosion.

2.26.8 **Entrance/Exit Area Heating**: Heat shall be supplied to the entrance and exit areas to maintain a tread surface temperature no less than 35 °F in an ambient of -10 °F to prevent accumulation of snow, ice or slush with the bus operating under design operating profile and corresponding door opening cycle. These heaters shall be Mobile Climate Control using brushless motors and standard electronic controls, or approved equal.

2.26.9 **Floor-Level Heating**: Sufficient floor-level heaters shall be provided to evenly supply heated forced air through floor ducts across the length of bus. Floor ducts may be discontinued at the upper level, but additional provisions to prevent cold floors and

ensure temperature uniformity shall be included. Control of the floor-level heating shall be through the main heating system electronic control.

2.27 **Exterior Panels, Finishes And Exterior Lighting**:

2.27.1 **Design**: The bus shall have a clean, smooth, modern looking, simple design, primarily derived from bus performance requirements, and passenger service criteria. The exterior and body features, including grilles and louvers, shall be shaped to facilitate cleaning by automatic bus washers without snagging washer brushes. Water and dirt shall not be retained in or on any body feature to freeze or bleed out onto the bus after leaving the washer. The body and windows shall be sealed to prevent leaking of air, dust or water under normal operating conditions and during cleaning in automatic bus washers for the service life of the bus. Exterior panels shall be sufficiently stiff to minimize vibration, drumming or flexing while the bus is in service. When panels are lapped, the upper and forward panels shall act as a watershed. However, if entry of moisture into the interior of the vehicle is prevented by other means, then rear cap panels may be lapped otherwise. The windows, hatches and doors shall be able to be sealed. Accumulation of spray and splash generated by the bus's wheels shall be minimized on windows and mirrors.

2.27.2 **Materials**: Body materials shall be selected and the body fabricated to reduce maintenance, extend durability and provide consistency of appearance throughout the service life of the bus. Detailing shall be kept simple, and add-on devices and trim shall be minimized and integrated into the basic design. There are no requirements for protection against graffiti/vandalism for body material surfaces.

2.27.3 **Roof-Mounted Equipment**: A non-skid, clearly marked walkway or steps shall be incorporated on the roof to provide access to equipment without damaging any system or bus paneling.

2.27.4 **Pedestrian Safety**: Exterior protrusions along the side and front of the bus greater than ½ in. and within 80 in. of the ground shall have a radius no less than the amount of the protrusion. The exterior rearview mirrors, cameras and required lights and reflectors are exempt from the protrusion requirement. Grilles, doors, bumpers and other features on the sides and rear of the bus shall be designed to minimize toeholds or handholds. Exterior protrusions shall not cause a line-of-sight blockage for the driver.

2.27.5 **Side Body Panels**: Structural elements supporting exterior body panels shall allow side body panels below the windows to be repaired in lengths not greater than 12.5 ft.

2.27.6 **Rain Gutters**: Rain gutters shall be provided to prevent water flowing from the roof onto the passenger doors and driver's side window. When the bus is decelerated, the gutters shall not drain onto the windshield, driver's side window or door boarding area. Cross-sections of the gutters shall be adequate for proper operation.

2.27.7 **License Plate Provisions**: Provisions shall be made to mount standard-size U.S./Canada license plates per SAE J686 on the front and rear of the bus. These provisions shall direct-mount or recess the license plates so that they can be cleaned by automatic bus-washing equipment without being caught by the brushes. The rear license plate provision shall be illuminated per SAE J587.

2.27.8 **Fender Skirts**: Features to minimize water spray from the bus in wet conditions shall be included in wheel housing design. Any fender skirts shall be easily replaceable. They shall be flexible if they extend beyond the allowable body width. Wheels and tires shall be removable with the fender skirts in place.

2.27.9 **Splash Aprons**: Splash aprons, composed of ¼ in. minimum composition or rubberized fabric, shall be installed behind and/or in front of wheels as needed to reduce road splash and protect underfloor components. The splash aprons shall extend downward to within 6 in. off the road surface at static conditions. Apron widths shall be no less than tire widths. Splash aprons shall be bolted to the bus understructure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. The flexible portions of the splash aprons shall not be included in the road clearance measurements. Splash apron shall be installed as necessary to protect the wheelchair loading device from road splash. Other splash aprons shall be installed where necessary to protect bus equipment. Full width rear splash apron shall be installed.

2.27.10 **Access Doors**: Conventional or pantograph hinged doors shall be used for the motor compartment and for all auxiliary equipment compartments including doors for checking the quantity and adding to the coolant, lubricants and transmission fluid. Access openings shall be sized for easy performance of tasks within the compartment, including tool operating space. Access doors shall be of rugged construction and shall maintain mechanical integrity and function under normal operations throughout the service life of the bus. They shall close flush with the body surface. All doors shall be hinged at the top or on the forward edge and shall be prevented from coming loose or opening during transit service or in bus washing operations. All access doors shall be retained in the open position by props or counterbalancing with over-center or gas-filled springs with safety props and shall be easily operable by one person. Springs and hinges shall be corrosion resistant. Latch handles shall be flush with, or recessed behind, the body contour and shall be sized to provide an adequate grip for opening. Access doors, when opened, shall not restrict access for servicing other components or systems. If precluded by design, the manufacturer shall provide door design information specifying how the requirements are met.

2.27.11 **Access Door Latch/Locks**: Access doors larger than 100 sq. in. in area shall be equipped with corrosion-resistant flush-mounted latches or locks except for coolant and fuel fill access doors. All such access doors that require a tool to open shall be standardized throughout the vehicle and will require a nominal 5/16 in. square male tool to open or lock.

2.27.12 **Bumper Location**: Bumpers shall provide impact protection for the front and rear of the bus with the top of the bumper being 26 in., ± 3 in., above the ground. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

2.27.13 **Front Bumper**: No part of the bus, including the bumper, shall be damaged as a result of a 5 mph impact of the bus at curb weight with a fixed, flat barrier perpendicular to the bus's longitudinal centerline. The bumper shall return to its pre-impact shape within 10 minutes of the impact. The bumper shall protect the bus from damage as a result of 6.5 mph impacts at any point by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lbs. parallel to the longitudinal centerline of the bus. It shall protect the bus from damage as a result of 5.5 mph impacts into the corners at a 30-degree angle to the longitudinal centerline of the bus. The energy absorption system of the bumper shall be independent of every power system of the bus and shall not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 in. Mounting provisions for integrated bike rack on front bumper to include installation of DL2 brushed stainless steel bike rack by Sportswork, 2 position bike rack.

2.27.14 **Rear Bumper**: No part of the bus, including the bumper, shall be damaged as a result of a 2 mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline

of the bus. The bumper shall return to its pre-impact shape within 10 minutes of the impact. When using a yard tug with a smooth, flat plate bumper 2 ft. wide contacting the horizontal centerline of the rear bumper, the bumper shall provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 in. high, and at accelerations up to 2 mph/sec. The rear bumper shall protect the bus, when impacted anywhere along its width by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lbs., at 4 mph parallel to or up to a 30-degree angle to, the longitudinal centerline of the bus. The rear bumper shall be shaped to preclude unauthorized riders standing on the bumper. The bumper shall not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 in.

2.27.15 **Bumper Material**: Bumper material shall be corrosion-resistant and withstand repeated impacts of the specified loads without sustaining damage. Visible surfaces shall be black. These bumper qualities shall be sustained throughout the service life of the bus.

2.27.16 **Finish and Color**: All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly prepared as required by the paint system Supplier prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the bus. Drilled holes and cutouts in exterior surfaces shall be made prior to cleaning, priming and painting, where possible, to prevent corrosion. The bus shall be completely painted prior to installation of exterior lights, windows, mirrors and other items that are applied to the exterior of the bus. Body filler materials may be used for surface dressing, but not for repair of damaged or improperly fitted panels. Paint shall be applied smoothly and evenly with the finished surface free of visible dirt and the following other imperfections:

2.27.16.1 Blisters or bubbles appearing in the topcoat film;

2.27.16.2 Chips, scratches, or gouges of the surface finish;

2.27.16.3 Cracks in the paint film;

2.27.16.4 Craters where paint failed to cover due to surface contamination;

2.27.16.5 Overspray;

2.27.16.6 Peeling;

2.27.16.7 Runs or sags from excessive flow and failure to adhere uniformly to the surface;

2.27.16.8 Chemical stains and water spots;

2.27.16.9 Dry patch due to incorrect mixing of paint activators;

2.27.16.10 Buffing swirls;

2.27.16.11 Gel-Coated composite panels in white are acceptable in lieu of painted panels;

2.27.16.12 All exterior finished surfaces shall be impervious to diesel fuel, gasoline and commercial cleaning agents. Finished surfaces shall resist damage by controlled applications of commonly used graffiti-removing chemicals;

2.27.16.13 Proper adhesion between the basic surface and successive coats of the original paint shall be measured using an Elcometer adhesion tester as outlined in ASTM D4541-85. Adhesion shall be a minimum 300 ft-lbs. The bus manufacturer shall supply test samples of the exterior surface for each step of the painting process that may be subject to adhesion testing per ASTM G4541-87 and ASTM D4145-85. ASTM D4541-93 may be used for inspection testing during assembly of the vehicle; and

2.27.16.14 The final paint color shall be white.

2.27.17 **Decals, Numbering and Signing**: Monograms, numbers and other special signing shall be applied to the inside and outside of the bus as required. Signs shall be durable and fade-chip- and peel-resistant. They may be painted signs, decals or pressure-sensitive appliqués. All decals shall be installed per the decal Supplier recommendations. Signs shall be provided in compliance with the ADA requirements defined in 49 CFR Part, Subpart B, 38.27 and FMVSS & CFR in both English and Spanish. COUNTY maintains a standard set of decals for the interior of the coach and shall provide a full detail (including size and location) of current decals to the contractor. Required interior decals (when possible the decals should use universal symbols or be available in English and Spanish):

2.27.17.1 No Smoking/No Eating/No Drinking
2.27.17.2 Priority Seating (for elderly)
2.27.17.3 Wheelchair Seating
2.27.17.4 Emergency Exits
2.27.17.5 Bus Number
2.27.17.6 Height of Bus
2.27.17.7 No Standing Past Yellow line
2.27.17.8 Watch Your Step

2.27.18 **Passenger Information**: ADA priority seating signs as required and defined by 49 CFR, Part 38.27 shall be provided to identify the seats designated for passengers with disabilities. Requirements for a public information system in accordance with 49 CFR, Part 38.35 shall be provided.

2.27.19 **Exterior Lighting**: Exterior lighting and reflectors shall comply, as applicable, with Part 393, Subpart B of the FMCSA and FMVSS 108. All lights shall be Dialight or approved equal. All exterior lights shall be designed to prevent entry and accumulation of moisture or dust. Commercially available LED-type lamps shall be utilized at all exterior lamp locations. Lamps, lenses and fixtures shall be interchangeable to the extent practicable. Two hazard lamps at the rear of the bus shall be visible from behind when the engine service doors are opened. Light lenses shall be designed and located to prevent damage when running the vehicle through an automatic bus washer. Front marker (clearance) lights along with lights located on the roof and sides of the bus shall have protective shields or be of the flush mount type to protect the lens against minor impacts. LED lamps shall be potted type and designed to last the life of the bus with a full lifetime warranty. Size of LED lamps used for tail, brake and turn signal lamps shall be a 4" round.

2.27.20 **Backup Light/Alarm**: Visible and audible warnings shall inform following vehicles or pedestrians of reverse operation. Visible reverse operation warning shall conform to SAE Standard J593. Audible reverse operation warning shall conform to SAE Recommended Practice J994 Type C or D.

2.27.21 **Doorway Lighting**: LED strip lamps at the front and rear passenger doorways shall comply with ADA requirements and shall activate only when the doors open. These lamps shall illuminate the street surface to a level of no less than 1 foot- candle for a distance of 3 ft. outward from the outboard edge of the door threshold. The lights may be positioned above or below the lower daylight opening of the windows and shall be shielded to protect passengers' eyes from glare. In addition, there shall be LED curb lamps installed on the outside of the bus at the doorways to further illuminate the boarding and alighting areas. There shall be one at the front door and two at the rear door, one on either side of the door opening.

2.27.22 **Turn Signals**: Turn-signal lights shall be provided on the front, rear, curb and street sides of the bus in accordance with FMVSS 108 and Part 393, Subpart B of the

FMCSA as applicable. Turn Signal lights shall be amber in color.

2.27.23 **Headlights**: Headlamps shall be designed for easy replacement of bulbs. Standard OEM headlight installation shall be provided in accordance with FMVSS 108 and Part 393, Subpart B of the FMCSA as applicable. Headlamps shall incorporate a daytime running light feature. Headlamps shall be LED0r halogen,.

2.27.24 **Brake Lights**: Brake lights shall be provided in accordance with FMVSS 108 and Part 393, Subpart B of the FMCSA as applicable.

2.27.25 **Center High Mounted Stop Lamps (CHMSL)**: Bus shall include two (2) red, high and center mount brake lamp(s) along the backside of the bus in addition to the lower brake lamps required under FMVSS 108. The high and center mount brake lamps shall illuminate in a flashing mode when the transmission is in forward mode and the regenerative braking is active. These lamps shall illuminate steady with brake application. The CHMSLs shall be 1" x 18" strip lights. Operation of the CHMSLs shall be programmable with the multiplex system

2.27.26 **Service Area Lighting (Interior and Exterior)**: LED lamps shall be provided in the motor and all other compartments where service may be required to generally illuminate the area for night emergency repairs or adjustments. These service areas shall include, but not be limited to, the motor compartment, the communication box, junction/apparatus panels and passenger door operator compartments. Lighting shall be adequate to light the space of the service areas to levels needed to complete typical emergency repairs and adjustments. The service area lamps shall be suitable for the environment in which they are mounted. Motor compartment lamps shall be controlled by a switch mounted near the rear start controls. All other service area lamps shall be controlled by switches mounted on or convenient to the lamp assemblies. Power to the service area lighting shall be programmable. Power shall latch on with activation of the switch and shall be automatically discontinued (timed out) after 30 minutes to prevent damage caused by inadvertently leaving the service area lighting switch in the on position after repairs are made.

2.28 **Interior Panels And Finishes**:

2.28.1 **General Requirements**: Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability and tactile qualities. Materials shall be strong enough to resist everyday abuse and be vandalism and corrosion resistant. Trim and attachment details shall be kept simple and unobtrusive. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

2.28.1.1 Interior surfaces more than 10 in. below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. Any components and other electrical components within close proximity to these surfaces shall also be resistant to this cleaning method.

2.28.1.2 The overall interior shall be material and color coordinated with the look of the flooring and seating, typically consisting of panels such as melamine, bulkhead carpeting, etc. County shall approve the final material and color.

2.28.1.3 There are no requirements for additional anti-graffiti/vandalism treatments for interior surfaces.

2.28.2 **Interior Panels**: Panels shall be easily replaceable and tamper-resistant. They shall be reinforced, as necessary, to resist vandalism and other rigors of transit bus service. Individual trim panels and parts shall be interchangeable to the extent practicable. Interior colors shall be as follows:

2.28.2.1 Sidewalls above the seat rail, to include window mullions- 4142 Gray Glace;
2.28.2.2 Ceiling Panels- 1500N60 Gray (Off White);
2.28.2.3 Rear Bulkhead- Medium Gray Carpet;
2.28.2.4 Materials shall comply with the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated October 20, 1993; and
2.28.2.5 The County is open to discussion and would currently consider composite or melamine-type material for the side panels.

2.28.3 **Driver Area Barrier**: A barrier or bulkhead between the driver and the street-side front passenger seat shall be provided. The barrier shall minimize glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation. Location and shape must permit full seat travel and reclining possibilities that can accommodate the shoulders of a 95th-percentile male. The partition shall have a side return and stanchion to prevent passenger from reaching the driver by standing behind the driver's seat. The lower area between the seat and panel must be accessible to the driver. The partition must be strong enough in conjunction with entire partition assembly for mounting of such equipment as flare kits, fire extinguishers (1.2 kg), microcomputer, public address amplifier, etc. Dark or black panels are preferred behind the driver's head. The panel should be isolated for noise control and attached with rubber grommets. The driver's barrier shall extend from the top of the wheel well to the ceiling the level of the seated driver and shall fit close to the bus side windows and wall to prevent passengers from reaching the driver or the driver's personal effects.

2.28.4 **Modesty Panels**: Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior shall be provided to act as both a physical and visual barrier for seated passengers.

2.28.4.1 Design and installation of modesty panels located in front of forward-facing seats shall include a handhold or grab handle along its top edge. These dividers shall be mounted on the sidewall and shall project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend from at least the window opening of the side windows, and those forward of transverse seats shall extend downward to 1 and 1½ in. above the floor. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways shall provide no less than a 2½ in. clearance between the modesty panel and a fully open, inward opening door, or the path of a deploying flip-out ramp to protect passengers from being pinched. Modesty panels installed at doorways shall be equipped with grab rails if passengers assist are not provided by other means.

2.28.4.2 The modesty panel and its mounting shall withstand a static force of 250 lbs. applied to a 4 × 4 in. area in the center of the panel without permanent visible deformation.

2.28.4.3 Clear non-glass panel from above the modesty panel to the top of the daylight opening and attached to the stanchion at the rear door exit.

2.28.5 **Front End**: The entire front end of the bus shall be sealed to prevent debris

accumulation behind the dash and to prevent the driver's feet from kicking or fouling wiring and other equipment. The front end shall be free of protrusions that are hazardous to passengers standing at the front of the standee line area of the bus during rapid decelerations. Paneling across the front of the bus and any trim around the driver's compartment shall be formed metal or composite material. Composite dash panels shall be reinforced as necessary, vandal-resistant and replaceable. All colored, painted and plated parts forward of the driver's barrier shall be finished with a surface that reduces glare. Any mounted equipment must have provision to support the weight of equipment.

2.28.6 **Rear Bulkhead**: The rear bulkhead and rear interior surfaces shall be carpeting and trimmed with stainless steel, aluminum or composite. The rear bulkhead paneling shall be contoured to fit the ceiling, side walls and seat backs so that any litter or trash will tend to fall to the floor or seating surface when the bus is on a level surface. Any air vents in this area shall be louvered to reduce airflow noise and to reduce the probability of trash or liter being thrown or drawn through the grille. If it is necessary to remove the panel to service components located on the rear bulkhead, the panel shall be hinged or shall be able to be easily removed and replaced. Grilles where access to or adjustment of equipment is required shall be heavy-duty and designed to minimize damage and limit unauthorized access.

2.28.7 **Headlining**: Ceiling panels shall be made of durable, corrosion resistant, easily cleanable material. Headlining shall be supported to prevent buckling, drumming or flexing and shall be secured without loose edges. Headlining materials shall be treated or insulated to prevent marks due to condensation where panels are in contact with metal members. Moldings and trim strips, as required to make the edges tamperproof, shall be stainless steel, aluminum or plastic, colored to complement the ceiling material. Headlining panels covering operational equipment that is mounted above the ceiling shall be on hinges for ease of service but retained to prevent inadvertent opening.

2.28.8 **Fastening**: Interior panels shall be attached so that there are no exposed unfinished or rough edges or rough surfaces. Fasteners should be corrosion resistant. Panels and fasteners shall not be easily removable by passengers. Exposed interior fasteners should be minimized, and where required shall be tamper-resistant.

2.28.9 **Insulation**: Any insulation material used between the inner and outer panels shall minimize the entry and/or retention of moisture. Insulation properties shall be unimpaired during the service life of the bus. Any insulation material used inside the engine compartment shall not absorb or retain oils or water and shall be designed to prevent casual damage that may occur during maintenance operations.

2.28.9.1 The combination of inner and outer panels on the sides, roof, wheel wells and ends of the bus, and any material used between these panels, shall provide a thermal insulation sufficient to meet the interior temperature requirements. The bus body shall be thoroughly sealed so that the driver or passengers cannot feel drafts during normal operations with the passenger doors closed.

2.28.9.2 All insulation materials shall comply with the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated October 20, 1993.

2.28.10 **Floor Covering**: The floor covering shall be Altro Transflor Chroma 2.7 a non-skid walking surface that remains effective in all weather conditions. The floor covering, as well as transitions of flooring material to the main floor and to the entrance and exit area, shall be smooth and present no tripping hazards. Seams shall be sealed/welded per manufacturer's specifications. The standee line shall be yellow in color, approximately 2 in. wide and shall extend across the bus aisle. The color and pattern shall be

consistent throughout the floor covering.

2.28.10.1 The color of the floor covering shall be Sigma (TFCR 2782).

2.28.10.2 Any areas on the floor that are not intended for standees, such as areas "swept" during passenger door operation, shall be clearly and permanently marked with yellow floor covering.

2.28.10.3 The floor shall be easily cleaned and shall be arranged to minimize debris accumulation.

2.28.10.4 A one-piece center strip shall extend from the vertical wall of the rear settee between the aisle sides of transverse seats to the standee line. If the floor is of a bi-level construction, then the center strip shall be one piece at each level. The covering between the center strip and the wheel housings may be separate pieces. At the rear door, however, a separate strip as wide as the door shall extend from the center strip to the outboard edge of the rear/exit area.

2.28.10.5 The floor under the seats shall be covered with smooth surface flooring material. The floor covering shall closely fit the sidewall in a fully sealed butt joint or extend to the top of the cove.

2.28.11 **Interior Lighting**: The light source shall be located to minimize windshield glare, with distribution of the light focused primarily on the passengers' reading plane while casting sufficient light onto the advertising display. The lighting system may be designed to form part of or the entire air distribution duct. The lighting system shall be Pretoria LED. The lens material shall be translucent polycarbonate. Lenses shall be designed to effectively "mask" the light source. Lenses shall be sealed to inhibit incursion of dust and insects yet be easily removable for service. Access panels shall be provided to allow servicing of components located behind light panels. If necessary, the entire light fixture shall be hinged. All additional interior lights shall be Dialight LED, or approved equal.

2.28.11.1 **Passenger**: The first light on each side (behind the driver and the front door) is normally turned on only when the front door is opened, in "night run" and "night park." As soon as the door closes, these lights shall go out. These lights shall be turned on at any time if the toggle switch is in the "on" position. All interior lighting shall be turned off whenever the transmission selector is in reverse and the engine run switch is in the "on" position. The interior lighting design shall require the approval of the County.

2.28.11.2 **Driver Area**: The driver's area shall have a light to provide general illumination, and it shall illuminate the half of the steering wheel nearest the driver to a level of 5 to 10 foot-candles.

2.28.11.3 **Seating Areas**: The interior lighting system shall provide a minimum 15 foot-candle illumination on a 1 sq. ft. plane at an angle of 45 degrees from horizontal, centered 33 in. above the floor and 24 in. in front of the seat back at each seat position. Allowable average light level for the rear bench seats shall be 7 foot-candles.

2.28.11.4 **Vestibules/Doors**: Floor surface in the aisles shall be a minimum of 10 foot-candles, and the vestibule area a minimum of 4 foot-candles with the

front doors open and a minimum of 2 foot-candles with the front doors closed. The front entrance area and curb lights shall illuminate when the front door is open and master run switch is in the "lights" positions. Rear exit area and curb lights shall illuminate when the rear door is unlocked.

2.28.11.5 **Step Lighting**: Step lighting for the intermediate steps between lower and upper floor levels shall be a minimum of 4 foot-candles and shall illuminate in all engine run positions. The step lighting shall be low-profile to minimize tripping and snagging hazards for passengers and shall be shielded as necessary to protect passengers' eyes from glare.

2.28.11.6 **Ramp Lighting**: Exterior and interior ramp lighting shall comply with CFR Part 49, Sections 19.29 and 19.31.

2.28.11.7 **Farebox Lighting**: A light fixture shall be mounted in the ceiling above the farebox location. The fixture shall be capable of projecting a concentrated beam of light on the farebox. This light will automatically come on whenever the front doors are opened and the run switch is in the "night run" or "night park" position.

2.28.12 **Fare Collection**: Space and structural provisions shall be made for installation of currently available fare collection devices and shall be as far forward as practicable. Location of the fare collection device shall not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and shall allow the driver to easily reach the farebox controls and to view the fare register. The fare box shall not restrict access to the driver area, shall not restrict operation of driver controls and shall not — either by itself or in combination with stanchions, transfer mounting, cutting and punching equipment, or route destination signs — restrict the driver's field of view per SAE Recommended Practice J1050. The location and mounting of the fare collection device shall allow use, without restriction, by passengers. The fare box location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the fare box shall be readable on a daily basis. The floor under the fare box shall be reinforced as necessary to provide a sturdy mounting platform and to prevent shaking of the fare box.

2.28.13 **Interior Access Panels and Doors**: Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Access doors shall be hinged with gas props or over-center springs, where practical, to hold the doors out of the mechanic's way. Panels shall prevent entry of mechanism lubricant into the bus interior. All fasteners that retain access panels shall be captive in the cover. Access doors shall be secured with locks. The locks shall be standardized so that only one tool is required to open access doors on the bus.

2.28.14 **Floor Panels**: Access openings in the floor shall be sealed to prevent entry of fumes and water into the bus interior. Flooring material at or around access openings shall be flush with the floor and shall be edge-bound with stainless steel or another material that is acceptable to the County to prevent the edges from coming loose. Access openings shall be asymmetrical so that reinstalled flooring shall be properly aligned. Fasteners shall tighten flush with the floor. The number of special fastener tools required for panel and access door fasteners shall be minimized.

2.29 **Passenger Accommodations:**

2.29.1 **Seating Arrangements and Seat Style**: The passenger seating arrangement in the bus shall be such that seating capacity is maximized and in compliance to the following requirements. The minimum number of seats required is 33. Passenger seating shall be

American Seating, model Insight or approved equal, stainless steel frames, VR-50 onserts w/ Holdsworth fabric and stainless steel backs. The seat color shall be 980 Gray with matching seatbacks. The onsert fabric color shall be Camira (BDK314).

2.29.1.1 The County recognizes that ramp location, foot room, hip-to-knee room, doorway type, width, seat construction, floor level type, seat spacing requirements, ramp or lift, number of wheelchair positions, etc. ultimately affect seating capacity and layout.

2.29.1.2 Passenger seats shall be arranged in a transverse, forward-facing configuration, except at the wheel housings and turntable, if applicable, where aisle-facing seats may be arranged as appropriate with due regard for passenger access and comfort. Other areas where aisle-facing seats may be provided are at wheelchair securement areas and platforms (such as for fuel tank storage space). The first row of forward facing seats, shall be a flip-up seats. See ADA section. Seats in the lower deck shall be cantilever mounting and the seats in the upper deck shall be T-pedestal.

2.29.1.3 Rearward Facing Seats are not permitted.

2.29.1.4 Padded Inserts/Cushioned Seats.

2.29.1.5 The passenger seats shall be equipped with VR-50 vandal-resistant inserts throughout the bus.

2.29.1.6 No requirement for a drain hole provision in seat inserts

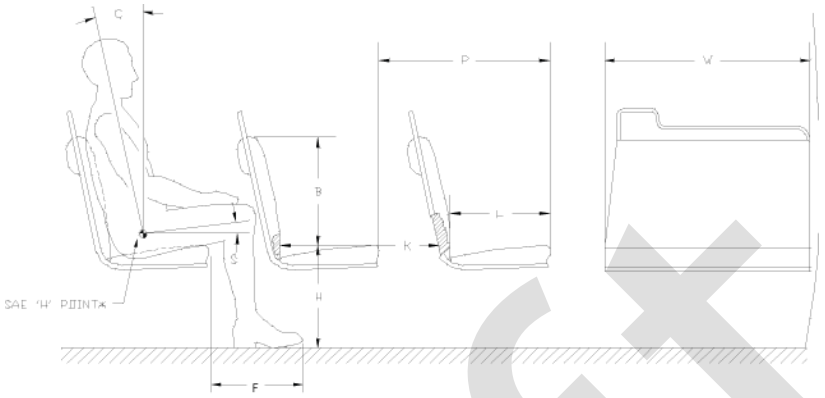
2.29.2 **Hip-to-Knee Room**: Hip-to-knee room measured from the center of the seating position, from the front of one seat back horizontally across the highest part of the seat to vertical surface immediately in front, shall be a minimum of 26 in. At all seating positions in paired transverse seats immediately behind other seating positions, hip-to-knee room shall be no less than 27 in.

2.29.3 **Foot Room**: Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, shall be no less than 14 in. Seats immediately behind the wheel housings and modesty panels may have foot room reduced.

2.29.4 **Aisles**: The aisle between the seats shall be no less than 20 in. wide at seated passenger hip height. Seat backs shall be shaped to increase this dimension to no less than 24 in. at 32 in. above the floor (standing passenger hip height).

2.29.5 **Seat Dimensions**: Seat dimensions for the various seating arrangements shall have the dimensions as follows (refer to Figure 7).

FIGURE 7
Seating Dimensions and Standard Configuration



2.29.5.1 The width, W, of the two-passenger transverse seat shall be a minimum 35 in.

2.29.5.2 The length, L, shall be 17 in., ±1 in.

2.29.5.3 The seat back height, B, shall be a minimum of 15 in.

2.29.5.4 The seat height, H, shall be 17 in., ± 1 in. For the rear lounge (or settee) and longitudinal seats, and seats located above raised areas for storage of under-floor components, a cushion height of up to 18 in., ±2 in., will be allowed. This shall also be allowed for limited transverse seats, but only with the expressed approval of the County.

2.29.5.5 Foot room = F.

2.29.5.6 The seat cushion slope, S, shall be between 5 and 11 degrees.

2.29.5.7 The seat back slope, C, shall be between 8 and 17 degrees.

2.29.5.8 Hip to knee room = K.

2.29.5.9 The pitch, P, is shown as reference only.

2.29.6 **Structure and Design**:

2.29.6.1 The passenger seat frame and its supporting structure shall be constructed and mounted so that space under the seat is maximized and is completely free of obstructions to facilitate cleaning.

2.29.6.2 Seats, structures and restraints around the securement area should not infringe into the mobility device envelope or maneuverability.

2.29.6.3 The transverse seat structure shall be fully cantilevered from the sidewall with sufficient strength for the intended service. The lowest part of the seat assembly that is within 12 in. of the aisle shall be at least 10 in. above the floor.

2.29.6.4 In locations at which cantilevered installation is precluded by design and/or structure, other seat mounting may be allowed.

2.29.6.5 All transverse objects — including seat backs, modesty panels, and longitudinal seats — in front of forward-facing seats shall not impart a compressive load in excess of 1000 lbs. onto the femur of passengers

ranging in size from a 5th-percentile female to a 95th-percentile male during a 10g deceleration of the bus. This deceleration shall peak at 0.05 to 0.015 seconds from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration shall not exceed 2 in., measured at the aisle side of the seat frame at height H. The seat back should not deflect more than 14 in., measured at the top of the seat back, in a controlled manner to minimize passenger injury. Structural failure of any part of the seat or sidewall shall not introduce a laceration hazard.

2.29.6.6 The seat assembly shall withstand static vertical forces of 500 lbs. applied to the top of the seat cushion in each seating position with less than ¼-in. permanent deformation in the seat or its mountings. The seat assembly shall withstand static horizontal forces of 500 lbs. evenly distributed along the top of the seat back with less than ¼-in. permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position shall withstand repeated impacts of two 40-lb sandbags without visible deterioration. One sandbag shall strike the front 40,000 times and the other sandbag shall strike the rear 40,000 times. Each sandbag shall be suspended on a 36-in. pendulum and shall strike the seat back 10,000 times each from distances of 6, 8, 10 and 12 in. Seats at both seating positions shall withstand 4000 vertical drops of a 40-lb sandbag without visible deterioration. The sandbag shall be dropped 1000 times each from heights of 6, 8, 10 and 12 in. Seat cushions shall withstand 100,000 randomly positioned 3½-in. drops of a squirming, 150-lb, smooth-surfaced, buttocks-shaped striker with only minimal wear on the seat covering and no failures to seat structure or cushion suspension components.

2.29.6.7 The back of each transverse seat shall incorporate a handhold no less than ⅞ in. in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 in. long that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. The upper rear portion of the seat back and the seat back handhold immediately forward of transverse seats shall be padded and/or constructed of energy absorbing materials. During a 10g deceleration of the bus, the HIC number (as defined by SAE Standard J211a) shall not exceed 400 for passengers ranging in size from a 5th percentile female through a 95th percentile male.

2.29.6.8 The seat back handhold may be deleted from seats that do not have another transverse seat directly behind and where a vertical assist is provided.

2.29.6.9 Longitudinal seats shall be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Armrests shall be included on the ends of each set of longitudinal seats except on the forward end of a seat set that is immediately to the rear of a transverse seat, the driver's barrier, or a modesty panel, when these fixtures perform the function of restraining passengers from sliding forward off the seat. Armrests are not required

on longitudinal seats located in the wheelchair parking area that fold up when the armrest on the adjacent fixed longitudinal seat is within 3½ in. of the end of the seat cushion. Armrests shall be located from 7 to 9 in. above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel. The top and sides of the armrests shall have a minimum width of 1 in. and shall be free from sharp protrusions that form a safety hazard.

2.29.6.10 Seat back handhold and armrests shall withstand static horizontal and vertical forces of 250 lbs. applied anywhere along their length with less than ¼-in. permanent deformation. Seat back handhold and armrests shall withstand 25,000 impacts in each direction of a horizontal force of 125 lbs. with less than ¼-in. permanent deformation and without visible deterioration.

2.29.7 **Construction and Materials**: Selected materials shall minimize damage from vandalism and shall reduce cleaning time. The seats shall be attached to the frame with tamper-resistant fasteners. Coloring shall be consistent throughout the seat material, with no visually exposed portion painted. Any exposed metal touching the sides or the floor of the bus shall be stainless steel. The seat, pads and cushions shall be contoured for individuality, lateral support and maximum comfort and shall fit the framework to reduce exposed edges. The minimum radius of any part of the seat back, handhold or modesty panel in the head or chest impact zone shall be a nominal ¼-in. The seat back and seat back handhold immediately forward of transverse seats shall be constructed of energy-absorbing materials to provide passenger protection and, in a severe crash, allow the passenger to deform the seating materials in the impact areas. Complete seat assemblies shall be interchangeable to the extent practicable. Seat fabric shall be Holdsworth, Camira BDK314.

2.29.8 **Passenger Assists**: Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th-percentile male and the 5th-percentile female standee. Starting from the entrance door and moving anywhere in the bus and out the exit door, a vertical assist shall be provided either as the vertical portion of seat back assist or as a separate item so that a 5th-percentile female passenger may easily move from one assist to another using one hand and the other without losing support. All handholds and stanchions at front doorway, around farebox, and at interior steps for bi-level designs shall be powder-coated in a high-contrast yellow color. The balance of the stanchions shall be brushed stainless steel. All passenger assists shall be knurled to provide additional grip for passengers.

2.29.9 **Assists**: Excluding those mounted on the seats and doors, the assists shall have a cross-sectional diameter between 1¼ and 1½ in. or shall provide an equivalent gripping surface with no corner radii less than ¼ in. All passenger assists shall permit a full hand grip with no less than 1½ in. of knuckle clearance around the assist. Passenger assists shall be designed to minimize catching or snagging of clothes or personal items and shall be capable of passing the NHTSA Drawstring Test. Any joints in the assist structure shall be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assists. Seat handholds may be of the same construction and finish as the seat frame. Door mounted passenger assists shall be of anodized aluminum, stainless steel or powder-coated metal. Connecting tees and angles may be powder-coated metal castings. Assists shall withstand a force of 300 lbs. applied over a 12-in. lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads and other fasteners used on the passenger assists shall be designed to eliminate pinching, snagging and cutting hazards and shall be free from burrs or rough edges.

2.29.10 **Front Doorway**: Front doors, or the entry area, shall be fitted with ADA-compliant assists. Assists shall be as far outward as practicable, but shall be located no farther inboard than 6 in. from the outside edge of the entrance step and shall be easily grasped by a 5th-percentile female boarding from street level. Door assists shall be functionally continuous with the horizontal front passenger assist and the vertical assist and the assists on the wheel housing or on the front modesty panel.

2.29.11 **Vestibule**: The aisle side of the driver's barrier, the wheel housings, and when applicable the modesty panels shall be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36 in. of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm. A horizontal passenger assist shall be located across the front of the bus and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the front door through the fare collection procedure. The assist shall be no less than 36 in. above the floor. The assists at the front of the bus shall be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the driver's barrier, wheel housings or front modesty panel.

2.29.12 **Rear Doorway(s)**: Vertical assists that are functionally continuous with the overhead assist shall be provided at the aisle side of the transverse seat immediately forward of the rear door and on the aisle side of the rear door modesty panel(s). Passenger assists shall be provided on modesty panels that are functionally continuous with the rear door assists. Rear doors, or the exit area, shall be fitted with assists having a cross-sectional diameter between 1¼ and 1½ in. or providing an equivalent gripping surface with no corner radii less than ¼ in., and shall provide at least 1½ in. of knuckle clearance between the assists and their mounting. The assists shall be designed to permit a 5th-percentile female to easily move from one assist to another during the entire exiting process. The assists shall be located no farther inboard than 6 in. from the outside edge of the rear doorway step.

2.29.13 **Overhead**: Except forward of the standee line and at the rear door, a continuous, full grip, overhead assist shall be provided. This assist shall be located over the center of the aisle seating position of the transverse seats. The assist shall be no less than 70 in. above the floor. Grab straps or other extensions as necessary shall be provided for sections where vertical assists are not available and for the use by passengers that cannot reach to 70 in. Grab straps shall be plastic. Overhead assists shall simultaneously support 150 lbs. on any 12-in. length. No more than 5 percent of the full grip feature shall be lost due to assist supports.

2.29.14 **Longitudinal Seat Assists**: Longitudinal seats shall have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 in. apart or functionally continuous for a 5th percentile female passenger.

2.29.15 **Wheel Housing Barriers/Assists**: Unless passenger seating is provided on top of wheel housing, passenger assists shall be mounted around the exposed sides of the wheel housings (and propulsion compartments if applicable), which shall also be designed to prevent passengers from sitting on wheel housings. Such passenger assists shall also effectively retain items, such as bags and luggage, placed on top of wheel housing.

2.29.16 **Passenger Doors**: Doorways will be provided in the locations and styles as follows. Passenger doors and doorways shall comply with ADA requirements. Front door location shall be forward of the front wheels and under direct observation of the driver. Rear doorway centerline shall be located rearward of the point midway between the front door centerline and the rearmost seat back. Front and rear door styles shall be slide glide. Provisions shall be made for operating the front door and curbside rear door independently or in the following combinations while providing positive tactile feedback to the operator identifying the door control selection. Electric-powered doors are required.

TABLE 7
Door Operating Combinations

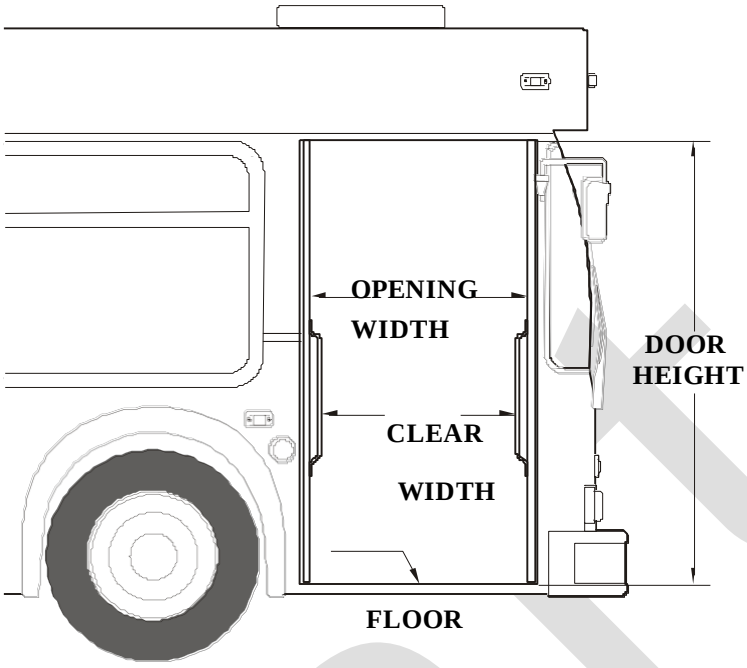
Front	Curbside Rear
Closed	Closed
Open	Closed
Open	Open
Closed	Open
Open	Open

2.29.17 **Materials and Construction**: Structure of the doors, their attachments, inside and outside trim panels and any mechanism exposed to the elements shall be corrosion-resistant. Door panel construction shall be of corrosion-resistant metal or reinforced non-metallic composite materials. When fully opened, the doors shall provide a firm support and shall not be damaged if used as an assist by passengers during ingress or egress. Door edges shall be sealed to prevent infiltration of exterior moisture, noise, dirt and air elements from entering the passenger compartment, to the maximum extent possible based on door types. The closing edge of each door panel shall have no less than 2 in. of soft weather stripping. The doors, when closed, shall be effectively sealed, and the hard surfaces of the doors shall be at least 4 in. apart. The combined weather seal and window glazing elements of the front door shall not exceed 10 degrees of binocular obstruction of the driver's view through the closed door.

2.29.18 **Transit Bus Minimum Door Opening**: When open, the doors shall leave an opening no less than 75.3 in. in height.

2.29.19 **Doorway Clear Width Greater than 31 ¾ in.**: The front door clear width shall be a minimum of 34 in. with the doors fully opened. The rear door clear width shall be a minimum of 34 in. with the doors fully opened.

FIGURE 8
Transit Bus Minimum Door Opening



2.29.20 **Door Glazing**: The upper section of both front and rear doors shall be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door shall be glazed for no less than 25 percent of the door opening area of the section. Door glazing shall be easily replaceable. The front and rear door panel glazing material shall have a nominal ¼ in. thick laminated safety glass conforming with the requirements of ANSI Z26.1 Test Grouping 2 and the Recommended Practices defined in SAE J673.

2.29.21 **Door Projection**: The exterior projection of the front doors beyond the side of the bus shall be minimized and shall not block the line of sight of the rear exit door via the curb side mirror when the doors are fully open. The exterior projection of both doors shall be minimized and shall not exceed 13 in. during the opening or closing cycles or when doors are fully opened. Projection inside the bus shall not cause an obstruction of the rear door mirror or cause a hazard for standees.

2.29.22 **Door Height Above Pavement**: It shall be possible to open and close either passenger door when the bus loaded to gross vehicle weight rating is not knelt and parked with the tires touching an 8-in.-high curb on a street sloping toward the curb so that the street side wheels are 5 in. higher than the right side wheels.

2.29.23 **Closing Force**:

2.29.23.1 Closing door edge speed shall not exceed 12 in. per second, and opening door speed shall not exceed 19 in. per second. Power doors shall not slam closed under any circumstance, even if the door is obstructed during the closing cycle. If a door is obstructed during the closing cycle, the pressure exerted on the obstruction shall not increase once initial contact has been made.

2.29.23.2 Power-close rear doors shall be equipped with an obstruction sensing system such that if an obstruction is within the path of the closing doors, the doors will stop and/or reverse direction prior to imparting a 10-lb force on 1 sq. in.

of that obstruction. If a contactless obstruction sensing system is employed, it shall be capable of discriminating between the normal doorway environment and passengers or other obstructions within the doorway, and of altering the zones of detection based upon the operating state of the door system.

2.29.23.3 Doors closed by a return spring or counterweight-type device shall be equipped with an obstruction- sensing device that, at a minimum, alerts the driver if an obstruction is detected between the closing doors. Doors closed by a return spring or counterweight type device, when unlocked, shall be capable of being pushed to the point where the door starts to open with a force not to exceed 25 lbs. applied to the center edge of the forward door panel.

2.29.23.4 Whether or not the obstruction sensing system is present or functional, it shall be possible to withdraw a 1½ in. diameter cylinder from between the center edges of a closed and locked door with an outward force not greater than 35 lbs.

2.29.24 **Actuators**:

2.29.24.1 Doors shall open or close completely in not more than 3.5 seconds from the time of control actuation and shall be subject to the closing force requirements.

2.29.24.2 Door actuators shall be adjustable so that the door opening and closing speeds can be independently adjustable to satisfy the above requirements. Actuators and the complex door mechanism shall be concealed from passengers but shall be easily accessible for servicing. The door actuators shall be rebuildable.

2.29.24.3 Door actuators and associated linkages shall maximize door holding forces in the fully open and fully closed positions to provide firm, non-rattling, non-fluttering door panels while minimizing the force exerted by the doors on an obstruction midway between the fully open and closed positions.

2.29.24.4 The rear doors shall be passenger-controlled. The vehicle operator shall unlock and enable the opening mechanism, which shall be annunciated by illumination of a green light near the door. After enabling and unlocking, the doors shall be opened by passenger activation of a contactless sensing system. The door controller shall be Vapor, CLASS.

2.29.24.5 Doors that employ a “swing” or pantograph geometry and/or are closed by a return spring or counterweight-type device shall be equipped with a positive mechanical holding device that automatically engages and prevents the actuation mechanism from being back-driven from the fully closed position. The holding device shall be overcome only when the driver’s door control is moved to an “Exit Door Enable” position and the vehicle is moving at a speed of less than 2 mph, or in the event of actuation of the emergency door release.

2.29.24.6 Locked doors shall require a force of more than 300 lbs. to open manually. When the locked doors are manually forced to open, damage shall be limited to the bending of minor door linkage with no resulting damage to the doors, actuators or complex mechanism.

2.29.25 **Emergency Operation**: In the event of an emergency, it shall be possible to manually open doors designated as emergency exits from inside the bus using a force of no more than 25 lbs. after actuating an unlocking device. The unlocking device shall be clearly marked as an emergency-only device and shall require two distinct actions to actuate. The respective door emergency unlocking device shall be accessible from the doorway area. The unlocking device shall be easily reset by the operator without special tools or opening the door mechanism enclosure. Doors that are required to be classified as "Emergency Exits" shall meet the requirements of FMVSS 217.

2.29.26 **Door Control**: The door control shall be located in the operator's area within the hand reach envelope described in SAE Recommended Practice J287, "Driver Hand Control Reach." The driver's door control shall provide tactile feedback to indicate commanded door position and resist inadvertent door actuation. The door controller shall be located on the street side.

2.29.27 **Door Controller**: The control device shall be protected from moisture. Mounting and location of the door control device handle shall be designed so that it is within comfortable, easy arm's reach of the seated driver. The door control device handle shall be free from interference by other equipment and have adequate clearance so as not to create a pinching hazard. Position of the door control handle shall result in the following operation of the front and rear doors:

2.29.27.1 Center position: Front door closed, rear door(s) closed or set to lock.
2.29.27.2 First position forward: Front door open, rear door(s) closed or set to lock.
2.29.27.3 Second position forward: Front door open, rear door(s) open or set to open.
2.29.27.4 First position back: Front door closed, rear door(s) open or set to open.
2.29.27.5 Second position back: Front door open, rear door(s) open or set to open.

2.29.28 **Door Open/Close**: Operation of, and power to, the front passenger doors shall be completely controlled by the operator. Power to rear doors shall be controlled by operator. After enabling, the rear doors shall be opened by the passenger. A switch shall be provided to enable the driver to obtain full control of the rear doors. A control or valve in the operator's compartment shall shut off the power to, and/or dump the power from, the front door mechanism to permit manual operation of the front door with the bus shut down. A master door switch, which is not within reach of the seated operator, when set in the "off" position shall close the rear/center doors, deactivate the door control system, release the interlocks, and permit only manual operation of the rear/center doors.

2.29.29 **Accessibility Provisions**: Space and body structural provisions shall be provided at the front door of the bus to accommodate a wheelchair loading system.

2.29.30 **Loading System Low-Floor Bus**: An automatically-controlled, power-operated ramp system compliant to requirements defined in 49 CFR Part 38, Subpart B, §38.23c shall provide ingress and egress quickly, safely and comfortably, both in forward and rearward directions, for a passenger in a wheelchair from a level street or curb. The wheelchair loading system shall be located at the front door, with the ramp being of a simple hinged, flip-out type design being capable of deploying to the ground at a maximum 6:1 slope, and shall be self-leveling. The ramp shall be rated for 1000 pounds minimum. The ramp shall be Ricon or approved equal.

2.29.31 **Wheelchair Accommodations**: Two forward-facing locations, as close to the wheelchair loading system as practical, shall provide parking space and securement system compliant with ADA requirements for a passenger in a wheelchair. Each wheelchair securement station shall be 60 inches in length and equipped with the Dual-Lok at the rear belt position and the ARM model belt device at the forward belt position.

2.29.32 **Interior Circulation**: Maneuvering room inside the bus shall accommodate easy travel for a passenger in a wheelchair from the loading device and from the designated securement area. It shall be designed so that no portion of the wheelchair protrudes into the aisle of the bus when parked in the designated parking space(s). When the positions are fully utilized, an aisle space of no less than 20 in. shall be maintained. As a guide, no width dimension should be less than 36 in. Areas requiring 90-degree turns of wheelchairs should have a clearance arc dimension no less than 45 in., and in the parking area where 180-degree turns are expected, space should be clear in a full 60-in.-diameter circle. A vertical clearance of 12 in. above the floor surface should be provided on the outside of turning areas for wheelchair footrest.

2.30 **Signage And Communication**:

2.30.1 **Destination Signs**: A destination sign system shall be furnished on the front, on the right side near the front door and rear route number sign. The sign system shall be Twin Vision, model Smart Series, 100% Amber LED, to include an OCU, front sign (16 rows x 160 columns), right side sign (14 rows x 108 columns) and rear sign (16 rows x 48 columns). The OCU shall be located above the Driver, in the left side overhead or front sign access panel. All signs shall be controlled via a single human-machine interface (HMI). In the absence of a single mobile data terminal (MDT), the HMI shall be conveniently located for the bus driver within reach of the seated driver. The destination sign compartments shall meet the following minimum requirements:

2.30.1.1 Compartments shall be designed to prevent condensation and entry of moisture and dirt.

2.30.1.2 Compartments shall be designed to prevent fogging of both compartment window and glazing on unit itself.

2.30.1.3 Access shall be provided to allow cleaning of inside compartment window and unit glazing.

2.30.1.4 Front window shall have an exterior display area of no less than 8.5 in. high by 56 in. wide.

2.30.2 **Interior Displays**: Provisions shall be made on the rear of the driver's barrier or equipment box located on the wheel well for a frame to retain information such as routes and schedules. Advertising media 11 in. high and 0.09 in. thick shall be retained near the juncture of the bus ceiling and sidewall. The retainers may be concave and shall support the media without adhesives. The media shall be illuminated by the interior light system. A Next Stop display is required

2.30.3 **Exterior Displays**: Provisions shall be made to integrate advertising into the exterior design of the bus.

2.30.4 **Passenger Stop Request/Exit Signal**: A passenger "stop requested" signal system that complies with applicable ADA requirements defined in 49 CFR, Part 38.37 shall be provided. The system shall consist of a heavy-duty pull cable with a yellow covering, chime and interior sign message. The pull cable shall be located the full length of the bus on the sidewalls at the level where the transom is located. If no transom window is required, the height of the pull cable shall approximate this transom level and shall be no greater than 63 in. as measured from the floor surface. It shall be easily accessible to all passengers, seated or standing. Pull cable(s) shall activate one or more solid state or magnetic proximity switches. At each wheelchair passenger position and at priority seating positions, additional provisions shall be included to allow a passenger in a mobility aid to easily activate the "stop requested" signal.

2.30.4.1 An auxiliary passenger "stop requested" signal shall be installed at the rear door to provide passengers standing in the rear door/exit area convenient means of activating the signal system. The signal shall be a heavy-duty push button type located in the rear door vicinity. Button shall be clearly identified as "passenger signal."

2.30.4.2 A single "stop requested" chime shall sound when the system is first activated. A double chime shall sound anytime the system is activated from wheelchair passenger areas.

2.30.4.3 Exit signals located in the wheelchair passenger area shall be no higher than 4 feet above the floor. Instructions shall be provided to clearly indicate function and operation of these signals.

2.30.5 **Camera Surveillance System**: Contractor shall provide and install a TransIT Solutions (TSI) Mobile Video Surveillance System on each bus. (Reference web site www.mytransitsolutions.com for TransIT Solutions contact information). Final equipment placement for each component will be agreed upon between COUNTY and Contractor prior to bus build. Each system shall consist of the TransIT Solutions (TSI) components and quantities as listed in the following table:

TRANSIT SOLUTIONS (TSI) PART #	DESCRIPTION	QTY PER BUS
DVR-00003	TransIT Solutions (TSI) Model mDVR6s Digital Video Recorder	1
HDD-00003	TransIT Solutions (TSI) 500 GB Removable Hard Drive For mDVR6s DVR	1
CAM-00007	TransIT Solutions (TSI) TransView 2.9mm IR Dome Camera For The Following Views: - Front Door / Farebox - Rear Door or Lift Door - Front to Rear Seating View	3
CAM-00004	TransIT Solutions (TSI) TransView 4.3mm Day/Night Dome Camera - For Road View Thru Front Windshield	1
CAM-00009	TransIT Solutions (TSI) TransView 2.9mm IR External Side View Camera - Mounted On Outside/Curbside Of Bus Above/In Front Of Front Door - Facing Rearward For View Of Curbside Of Bus.	1
CAM-105	TransIT Solutions (TSI) TransView 2.9mm IR External Rear Camera (Bar Style) - Mounted Outside On Rear Of Bus Near Top With View Of The Road And Rear Of Bus.	1
BRK-00001	TransIT Solutions (TSI) TransView Front Camera Mount	1
WLS-00306	TransIT Solutions (TSI) TransView 802.11n Wireless AP, Antenna, and Mounting Bracket	1
ACC-00002	TransIT Solutions (TSI) TransView LED Status Module	1
ACC-00005	TransIT Solutions (TSI) TransView Event Button	1
ACC-00007	TransIT Solutions (TSI) TransView 3-Axis Accelerometer	1
ACC-00003	TSI TransView Garmin GPS With Gasket	1

ENC-00002	TransIT Solutions (TSI) Lockable Enclosure For mDVR6s (or other lockable enclosure supplied by bus manufacturer that is sufficient for housing the mDVR6s).	1
CBL-HARNESS-HC-00100	Cable Harness For COUNTY/Howard County Mobile Video Configuration Outlined Above.	1

2.30.6 **Public Address System**: Public address announcements shall be provided thru the voice annunciator system for facilitating radio system and driver-originated announcements to passengers.

2.30.7 **Speakers**: Six (6) interior loudspeakers shall be provided, semi-flush mounted, on alternate sides of the bus passenger compartment, installed with proper phasing. Total impedance seen at the input connecting end shall be 8 Ohms. Mounting shall be accomplished with riv-nuts and machine screws. One exterior loudspeaker shall be provided, semi-flush mounted near the front door of the coach for announcement and arrival information. The speaker cable shall terminate at the instrument panel area on the curb side with a minimum of 3 feet of extra speaker cable. An end connector shall be supplied so a lead can be connected from the radio control head in order to make announcements directly from the transit control center to passengers through the PA system.

2.30.8 **Automatic Passenger Counter (APC)**: The Automatic Passenger Counter (APC) shall be Infodev Communications gateway GW-200 and Sensor(s) DA-200. This equipment is custom programmed by NextBus to work together within the system. Any bus vendors should contact NextBus directly for sales inquiries.

2.30.9 **Voice Annunciator**: The Voice Annunciator system shall be a Digital Recorder DR600 with GPS auto trigger. The control shall be a LT2 with single point control of signs and annunciator. There shall be a single line amber LED interior sign with 'Stop Request.'

2.30.10 **Automatic Vehicle Locator (AVL)**: The Automatic Vehicle Locator (AVL) shall be Interfleet (part of Webtech Wireless), model number ATMEL. This equipment is custom programmed by NextBus to work together within the system. Any bus vendors should contact NextBus directly for sales inquiries.

2.30.11 **Mobile Data Terminal (MDT)**: The Mobile Data Terminal (MDT) shall be Micronet, model number Net-960e. This equipment is custom programmed by NextBus to work together within the system. Any bus vendors should contact NextBus directly for sales inquiries.

2.30.12 **Management / Control and Data Systems**: Three data systems shall be provided: a high level system located at the central depot facility that serves as the hub for overnight charging of the energy storage system, one at the on route inductive charging stations, and one on-board each bus. The high level data system shall be in communication with the charging stations and buses. Information level systems that require vehicle information for their operations or provide information shall adhere to J1939 data standard.

2.30.13 **High Level System**: The high level system shall collect data from each component within the system and provide summary reports, such as utility, energy, charging profiles, health checks, alarms, mileage, etc. The high level controller shall also be the point of transferring instruction and re-programming to the charging station and buses. The Contractor shall provide a complete list of data elements reportable from charging stations and buses, respectively.

2.30.14 **Charging Station Level System**: The charging station level system shall be the control point for each on route charging stations and provide site specific utility, duty cycle and incident monitoring. The system shall manage a store records on each charge event, including, but not limited to bus ID, charger status, faults, beginning SOC, ending SOC, energy consumption at the Mains Supply, energy consumption at the charge interface, max power, ambient temperature, etc. The system shall be in communication with the high level site controller in real time.

2.30.15 **Bus Level System**: The bus level system shall manage the propulsion system instruction on board each bus and store data records representing the propulsion system activity at 1 second intervals, such as duty cycle information (time, location, altitude, speed), voltage and current input and output for major electrical components (ESS, power converters, HVAC, etc.), traction motor input voltage and current, traction motor output torque and rotational speed, system health, BMS information, and faults. The on-board system shall be capable of profiling and reporting energy consumption of bus and major components including ESS energy flow, tractive energy, HVAC, regenerative braking and hotel load, such as, lighting, steering, fans, cooling, air, system faults, etc. Necessary bus data shall be communicated to each on route charging system throughout the day during the charging session, and to the high level site system upon returning to the depot for overnight charging of the batteries. This on-board system shall also be capable of storing one week of all data and reports in memory that can be downloaded from the bus using a standard laptop computer.

2.31 **Charging Stations**: These general requirements apply to all charging stations that may be delivered under the Contract. The Contractor shall provide and install charging equipment and related charger interface and the control and data system needed to recharge the propulsion system batteries. The subject hardware deliverable shall begin at the point of connection to the "grid" and include the meter, transformers and junction boxes necessary to provide input to the charging equipment. The Contractor shall provide all charging equipment and charger Interface requirements and specifications to County and their designated architectural, civil, electrical, and mechanical contractors to enable site preparation of the Charging Station for the installation of Contractor's charging equipment. The Contractor shall provide close coordination with the County and its contractors before and during site preparation for the charging stations. The Contractor shall be responsible for setting and securing the charging equipment as well as connection to any necessary utilities (electrical, water, etc.) The Contractor shall be responsible for adequate testing of the inductive charging equipment to ensure that the charging equipment meets all stated specifications and functionality prior to site restoration.

2.31.1 The chargers shall be UL Classified for the intended purpose. The charging systems shall be capable of delivering the optimal battery charge profile as specified by the battery manufacturer and charging the installed traction battery to a fully charged state from the minimum recommended state-of-charge including necessary cool-down time as specified by the battery manufacturer. The chargers shall be capable of connection to a 277/480-volt, 3-phase, 60-Hz electrical supply. The chargers shall be equipped with an E-Mon Class 3200 submeter (or approved equal) which:

2.31.1.1 Measures and displays kWh consumed and real time load in KW within 1% accuracy;

2.31.1.2 Is capable of RS-485 communications; and

2.31.1.3 Records kWh and kVARh delivered, kWh and kVARh received. Data stored in 15-minute intervals for up to 72 days or 5-minute intervals for up to 24 days. Maintains interval data storage in a first-in, first-out format.

2.31.2 The Procuring County shall furnish the chargers with all connectors, interfaces, and ancillary items necessary for use in accordance with the 2011 National Electrical Code (NEC®). These specifications do not include a full and complete description of all parts, materials, systems, services or processes necessary to successfully integrate the charger(s) with the subject buses. Contractor shall be responsible for working directly with Procuring County personnel to ensure that all aspects of integration and operation fully conform to Procuring County standards and recommended best practices.

2.31.3 Battery chargers shall be configured to automatically apply a charging protocol appropriate to the battery's state-of-charge, in accordance with the battery manufacturer's recommended practices. Battery charger shall be configured to automatically initiate and sustain charging at any battery state-of-charge if properly connected when so signaled by an external timing circuit. The battery charger shall be configured to automatically terminate the charge on attainment of a full state-of-charge or in the event of hazardous or anomalous conditions. Battery chargers shall be able to apply commissioning, equalization or conditioning charges according to the battery manufacturer's recommended practices when so configured by operation of keyboard or switch panel inputs. The battery charger shall be configured to automatically restart after unintended interruption of a charging episode due to interruption or temporary degradation of electrical service. The battery chargers shall be configured to interface with on-board battery management and interlock systems.

2.31.4 The actual charge profiles that the subject chargers deliver while charging, commissioning, equalizing, and conditioning the battery systems of the subject buses shall be recorded by the Contractor and shall be submitted to the battery manufacturer for review and approval. Written confirmation from the battery manufacturer attesting to the appropriateness of the delivered charge profile shall be submitted to Procuring County concurrent with or prior to delivery of the first bus.

2.31.5 The buses must be immobilized during all charging operations. Upon successful engagement of the charging interface, the bus shall be interlocked such that propulsion is rendered non-tractive and the brakes applied.

2.31.5 Conductive cabling connecting depot and convenience chargers to the bus shall be of fifteen-foot length. The connectors shall be industry standard and of simple design and heavy-duty construction and shall not be energized except when mated with the bus mounted receptacle. A single bus mounted receptacle shall serve both the depot charging station and the opportunity charging station. The bus mounted receptacle shall be of simple design and heavy-duty construction and shall not be energized except when mated with the charger connectors.

2.31.6 Both on route and depot charging station equipment shall be capable of operating continuously without performance or safety degradations in environmental conditions typically found at the County location. For the purposes of these Specifications such environmental conditions shall mean:

2.31.6.1 Storage temperature when not in service: -25 to +60 Deg C
2.31.6.2 Ambient service temperature: -15 to 40 Deg C
2.31.6.3 Maximum service altitude: 1000m above sea level @40 Deg C w/o de-rating
2.31.6.4 Relative humidity range: 5 to 95%, no condensation allowed

2.31.7 Chargers shall not produce harmonic distortion in excess of 5% THD. Charging circuits shall be isolated from the vehicle chassis such that ground current from the grounded chassis does not exceed 5 mA.

2.31.8 **On Route Inductive Charging Station**: Contractor's charging equipment shall be installed at the Charging Station on the selected route to enable charging of the bus while exchanging passengers at a scheduled stop. Contractor shall provide charging equipment for one Charging Station at the selected route. The charging station will be

limited to charging one electric bus at a time.

2.31.9 Buses shall stop for a maximum of 10 minutes at each Charging Station, including time to engage and disengage the charging interface. Charging Equipment must be sized to recharge the batteries to allow buses to operate on the selected route described in Section TS 8.2 Design Operating Profile. Termination of the charging process shall be executed either:

2.31.9.1 After a pre-programmed time (e.g., 3 minutes);

2.31.9.2 By the bus driver; and

2.31.9.3 Automatically upon reaching Maximum SOC.

2.31.10 The Charging Interface must be inductive. The Charging Interface, which supplies electricity between the charging equipment and the bus, shall be a design that is considered "industry standard" with respect to the connector to the charging equipment, connector to the bus, connection methods, communications protocol, and data exchanged between the charging equipment and the vehicle.

2.31.11 The Charging System must include the following protections and driver alerts: (i) dynamic state of charge of the Energy Storage System, (ii) charge rate, and (iii) fault codes for Charging System failure alerting the operator to the severity of the fault.

2.31.12 The Charging Station, including the Charging Interface, Charging Equipment, and supporting components and systems shall not interfere with the normal operation of the bus, passengers, pedestrians, or other vehicular traffic. Any aboveground equipment associated with the Charging Station must be vandal-resistant and weatherproof.

2.31.13 The bid package shall contain a complete description of the Charging System including principle of operation, equipment components, component specifications, IP/UL protection classes, environmental requirements, general installation requirements, etc.

2.31.14 The bid package shall contain a complete description of the inductive charge process for the proposed system including operator procedures for charging. Pickup positioning procedures must be described along with time estimates for accomplishing each of the steps.

2.31.15 The Contractor shall provide the option to furnish an additional inductive charging station at a secondary location on the specified route. The additional charging station must meet the same requirements as defined for the primary inductive station in this RFP. If the option is exercised, both primary and secondary inductive charging stations would be installed concurrently.

2.31.16 **Wireless Communication System**: The Charging Stations shall be equipped with a wireless communication system to transmit information on each charge event, including, but not limited to bus ID, charger status, faults, beginning SOC, ending SOC, charge duration, energy consumption at the Mains Supply, energy consumption at the charge interface, max power, ambient temperature, etc.

2.31.17 **Depot Charging Station**: Contractor shall furnish and install one conventional plug-in charge station at the COUNTY bus depot for overnight charging and any necessary conditioning of the batteries. Contractor shall provide charging equipment to allow for simultaneous charging of three (3) buses at a time. Contractor may vary the size of the Charging Equipment at the COUNTY bus depot to allow for overnight charging and battery conditioning, if necessary, for a minimum of thirty (30) minutes and a maximum of three hours, per bus. Buses shall be charged to Maximum SOC at a rate that maximizes life of the batteries.

2.32 **Warranty Requirements:**

2.32.1 **Contractor Warranty**: Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement, the Contractor warrants and guarantees to the original County each complete bus, charging equipment, and specific subsystems and components as follows. Performance requirements based on design criteria shall not be deemed a warranty item.

2.32.2 **Complete Bus**: The complete bus, bumper to bumper, excluding only those items of normal wear such as brake lining, etc. and items routinely changed within the PMI such as filters, fluids, etc., are warranted to be free from Defects and Related Defects for one year or 50,000 miles, whichever comes first, beginning on the date of bus and charging system acceptance under "Inspection, Testing and Acceptance," per this RFP. The warranty is based on regular operation of the bus under the operating conditions prevailing in the County's locale.

2.32.3 **Body and Chassis Structure**: Body, body structure, and structural elements of the suspension are warranted to be free from Defects and Related Defects for three years or 150,000 miles, whichever comes first. Primary load-carrying members of the bus structure, including structural elements of the suspension, are warranted against corrosion failure and/or Fatigue Failure sufficient to cause a Class 1 or Class 2 Failure for a period of 12 years or 500,000 miles, whichever comes first.

2.32.4 **Major Sub-Systems**: Major Subsystems Warranty for the bus and charging equipment shall be as follows:

TABLE 1
Major Sub-Systems Warranty

System	Item	Warranty Term		Extended Warranty	
		Mileage	Duration (years)	Mileage	Duration (years)
Entire Coach	Bumper to Bumper	50,000	1	N/A	N/A
Propulsion	Motors, transmissions, gearing	150,000	3	300,000	6
	Controller, Inverter	150,000	3	300,000	6
	Energy Storage	150,000	3	300,000	6
HVAC	Hermetic Compressor	100,000	2	150,000	3
	Electric Motors & Controller	100,000	2	150,000	3
Axles	Steering	50,000	1		
	Drive	300,000	5		
	Differential	300,000	5		
Charging Equipment	Charger	n/a	3	n/a	12
	Charger Interface	n/a	3	n/a	12
	Controller	n/a	3	n/a	12

2.32.5 **Subsystems**: Other subsystems shall be warranted to be free from Defects and Related Defects for two years or 100,000 miles, whichever comes first. Other subsystems are listed below:

2.32.5.1 Brake system: Foundation brake components, including advancing mechanisms, as supplied with the axles, excluding friction surfaces;

2.32.5.2 Electrical wiring and harnesses;

2.32.5.3 Heating, ventilating: Roof and/or rear main unit only, excluding floor heaters and front defroster;

2.32.5.4 AC unit and compressor: Roof and/or rear main unit only, excluding floor heaters and front defroster;

2.32.5.5 Door systems: Door operating actuators and linkages;

2.32.5.6 Air compressor;

2.32.5.7 Air dryer;

2.32.5.8 Hydraulic systems: Including radiator fan drive and power steering as applicable;

2.32.5.9 Cooling systems: Radiator including core, tanks and related framework, including surge tank;

2.32.5.10 Passenger seating excluding upholstery;

2.32.5.11 Destination signs: All destination sign equipment for the front, side and rear signs, power modules and operator control;

2.32.5.12 Wheelchair lift and ramp system: Lift and/or ramp parts and mechanical only;

2.32.5.13 Surveillance system including cameras and video recorders;

2.32.5.14 Wireless communication system; and

2.32.5.15 Fire Suppression System.

2.32.6 **Charging Equipment**: The Contractor warrants the charging equipment for three years. The charging equipment shall include, but is not limited to, the following components:

2.32.6.1 Chargers;
2.32.6.2 Bus/Charger Interface; and
2.32.6.3 Controller.

2.32.7 **Extended Warranty – Optionally priced**: The County requires the following additional extended warranties.

2.32.7.1 Motors, Transmissions, Gearing – Additional 3 years/300,000 miles (years 4 - 6);

2.32.7.2 Controller, Inverter – Additional 3 years/300,000 miles (years 4 - 6);

2.32.7.3 Energy Storage – Additional 3 years/300,000 miles (years 4 - 6);

2.32.7.4 Chargers - Additional 9 years (year 4-12);

2.32.7.5 Bus / Charger Interface – Additional 9 years (year 4-12); and

2.32.7.6 Controller – Additional 9 years (year 4-12).

2.32.8 **Serial Numbers**: Upon delivery of each bus, the Contractor shall provide a complete electronic list of serialized units installed on each bus to facilitate warranty tracking. The list shall include, but is not limited to:

2.32.8.1 Electric Drive Motor (s);
2.32.8.2 Energy Storage Module(s);
2.32.8.3 Propulsion System Controller / Inverter(s);
2.32.8.4 HVAC System, major components;
2.32.8.5 Steering Axle;
2.32.8.6 Drive Axle;
2.32.8.7 Power Steering Unit
2.32.8.8 Air Compressor;
2.32.8.9 Wheelchair Ramp;
2.32.8.10 Video Surveillance System;
2.32.8.11 Transmart Radio System;
2.32.8.12 Charger/Controller/EVSE;
2.32.8.13 Charger Interface; and
2.32.8.14 The Contractor shall provide updated serial numbers resulting from warranty campaigns. The format of the list shall be approved by the County prior to delivery of the first production bus.

2.32.9 **Extension of Warranty**: If, during the warranty period, repairs or modifications on any bus are made necessary by defective design, materials or workmanship but are not completed due to lack of material or inability to provide the proper repair for thirty (30) calendar days, the applicable warranty period shall be extended by the number of days equal to the delay period.

2.32.10 **Voiding of Warranty**: The warranty shall not apply to the failure of any part or component of the bus that directly results from misuse, negligence, accident or repairs not conducted in accordance with the Contractor-provided maintenance manuals and with workmanship performed by adequately trained personnel in accordance with recognized standards of the industry. The warranty also shall be void if the County fails to conduct normal inspections and scheduled preventive maintenance procedures as recommended in the Contractor's maintenance manuals and if that omission caused the part or component failure. The County shall maintain documentation, auditable by the Contractor, verifying service activities in conformance with the Contractor's maintenance manuals.

2.32.11 **Exceptions and Additions to Warranty**: The warranty shall not apply to the following items:

2.32.11.1 Scheduled maintenance items;
2.32.11.2 Normal wear-out items; and
2.32.11.3 Items furnished by the County.

2.32.12 Should the County require the use of a specific product and has rejected the Contractor's request for an alternate product, then the standard Supplier warranty for that product shall be the only warranty provided to the County. This product will not be eligible under "Fleet Defects," below. The Contractor shall not be required to provide warranty information for any warranty that is less than or equal to the warranty periods listed.

2.32.12.1 **Pass-Through Warranty**: Should the Contractor elect to not administer warranty claims on certain components and wish to transfer this responsibility to the sub-Suppliers, or to others, the Contractor shall request this waiver. Contractor shall state in writing that the County's warranty reimbursements will not be impacted. The Contractor also shall state in writing any exceptions and reimbursement including all costs incurred in transport of vehicles and/or components. At any time during the warranty period, the Contractor may request approval from the County to assign its warranty obligations to others, but only on a case-by-case basis approved in writing by the County. Otherwise, the Contractor shall be solely responsible for the administration of the warranty as

specified. Warranty administration by others does not eliminate the warranty liability and responsibility of the Contractor.

2.32.12.2 **Superior Warranty**: The Contractor shall pass on to the County any warranty offered by a component Supplier that is superior to that required herein. The Contractor shall provide a list to the County noting the conditions and limitations of the Superior Warranty not later than the start of production. The Superior Warranty shall not be administered by the Contractor.

2.32.13 **Fleet Defects Occurrence and Remedy**: A Fleet Defect is defined as cumulative failures of the greater of fifty (50) percent of the same components in the same or similar application or two (2) or more buses where such items are covered by warranty. A Fleet Defect shall apply only to the base warranty period in sections entitled "Complete Bus," "Propulsion System" and "Major Subsystems." When a Fleet Defect is declared, the remaining warranty on that item/component stops. The warranty period does not restart until the Fleet Defect is corrected. For the purpose of Fleet Defects, each option order shall be treated as a separate bus fleet. In addition, should there be a change in a major component within either the base order or an option order, the buses containing the new major component shall become a separate bus fleet for the purposes of Fleet Defects. The Contractor shall correct a Fleet Defect under the warranty provisions defined in "Repair Procedures." After correcting the Defect, the County and the Contractor shall mutually agree to and the Contractor shall promptly undertake and complete a work program reasonably designed to prevent the occurrence of the same Defect in all other buses and spare parts purchased under this Contract. Where the specific Defect can be solely attributed to particular identifiable part(s), the work program shall include redesign and/or replacement of only the defectively designed and/or manufactured part(s). In all other cases, the work program shall include inspection and/or correction of all of the buses in the fleet via a mutually agreed-to arrangement. The Contractor shall update, as necessary, technical support information (parts, service and operator's manuals) due to changes resulting from warranty repairs. The County may immediately declare a Defect in design resulting in a safety hazard to be a Fleet Defect. The Contractor shall be responsible to furnish, install and replace all defective units.

2.32.14 **Exceptions to Fleet Defect Provisions**: The Fleet Defect warranty provisions shall not apply to County-supplied items, such as radios, fare collection equipment, communication systems and tires.

2.32.15 **Repair Performance**: The Contractor is responsible for all warranty-covered repair Work. To the extent practicable, the County will allow the Contractor or its designated representative to perform such Work. At its discretion, the County may perform such Work if it determines it needs to do so based on transit service or other requirements. Such Work shall be reimbursed by the Contractor.

2.32.16 **Repairs by the Contractor**: If the County detects a Defect within the warranty periods defined in this section, it shall, within thirty (30) days, notify the Contractor's designated representative. The Contractor or its designated representative shall, if requested, begin Work on warranty-covered repairs within five calendar days after receiving notification of a Defect from the County. The County shall make the bus available to complete repairs timely with the Contractor's repair schedule. The Contractor shall provide at its own expense all spare parts, tools and space required to complete repairs. At the County's option, the Contractor may be required to remove the bus from the County's property while repairs are being affected. If the bus is removed from the County's property, repair procedures must be diligently pursued by the Contractor's representative.

2.32.17 **Repairs by the County**: If the County performs the warranty-covered repairs, it shall correct or repair the Defect and any Related Defects utilizing parts supplied by the Contractor specifically for this repair. At its discretion, the County may use Contractor-specified parts available from its own stock if deemed in its best interests.

2.32.18 **Contractor-Supplied Parts**: The County may require that the Contractor supply parts for warranty-covered repairs being performed by the County. Those parts may be remanufactured but shall have the same form, fit and function, and warranty. The parts shall be shipped prepaid to the County from any source selected by the Contractor within fourteen (14) days of receipt of the request for said parts and shall not be subject to an County handling charge.

2.32.19 **Defective Component Return**: The Contractor may request that parts covered by the warranty be returned to the manufacturing plant. The freight costs for this action shall be paid by the Contractor. Materials should be returned in accordance with the procedures outlined in "Warranty Processing Procedures."

2.32.20 **Failure Analysis**: The Contractor shall, upon specific request of the County, provide a failure analysis of Fleet Defect or safety-related parts, or major components, removed from buses under the terms of the warranty that could affect fleet operation. Such reports shall be delivered within 60 days of the receipt of failed parts.

2.32.21 **Reimbursement for Labor and Other Related Costs**: The County shall be reimbursed by the Contractor for labor. The amount shall be determined by the County for a qualified mechanic at a straight time wage rate equivalent to the County's most recently published rate (currently $75 per hour) in effect at the time the Work is performed inclusive of fringe benefits and overhead, plus the cost of towing the bus if such action was necessary and if the bus was in the normal service area. These wage and fringe benefit rates shall not exceed the rates in effect in the County's service garage at the time the Defect correction is made.

2.32.22 **Reimbursement for Parts**: The County shall be reimbursed by the Contractor for defective parts and for parts that must be replaced to correct the Defect. The reimbursement shall be at the current price at the time of repair and shall including taxes where applicable, plus fifteen (15) percent handling costs not to exceed $100 per claim. Handling costs shall not be paid if part is supplied by Contractor and shipped to County.

2.32.23 **Reimbursement Requirements**: The Contractor shall respond to the warranty claim with an accept/reject decision including necessary failure analysis no later than sixty (60) days after the County submits the claim and defective part(s), when requested. Reimbursement for all accepted claims shall occur no later than sixty (60) days from the date of acceptance of a valid claim. The County may dispute rejected claims or claims for which the Contractor did not reimburse the full amount. The parties agree to review disputed warranty claims during the following quarter to reach an equitable decision to permit the disputed claim to be resolved and closed. The parties also agree to review all claims at least once per quarter throughout the entire warranty period to ensure that open claims are being tracked and properly dispositioned.

2.32.24 **Warranty after Replacement/Repairs**: If any component, unit or subsystem is repaired, rebuilt or replaced by the Contractor or by the County with the concurrence of the Contractor, the component, unit or subsystem shall have the unexpired warranty period of the original. Repairs shall not be warranted if the Contractor-provided or authorized parts are not used for the repair, unless the Contractor has failed to respond within five days, in accordance with "Repairs by the Contractor." If an item is declared to be a Fleet Defect, the warranty stops with the declaration of the Fleet Defect. Once the Fleet Defect is corrected, the item(s) shall have three (3) months or remaining time and/or miles of the original warranty, whichever is greater. This remaining warranty

period shall begin on the repair/replacement date for corrected items on each bus if the repairs are completed by the Contractor or on the date the Contractor provides all parts to the County.

2.32.25 **Warranty Processing Procedures**: The following list represents requirements by the Contractor to the County for processing warranty claims. One failure per bus per claim is allowed.

2.32.25.1 Bus number and VIN;
2.32.25.2 Total vehicle life mileage at time of repair;
2.32.25.3 Date of failure/repair;
2.32.25.4 Acceptance/in-service date;
2.32.25.5 Contractor part number and description;
2.32.25.6 Component serial number;
2.32.25.7 Description of failure;
2.32.25.8 All costs associated with each failure/repair (invoices may be required for third-party costs):
2.32.25.8.1 Towing;
2.32.25.8.2 Road calls;
2.32.25.8.3 Labor;
2.32.25.8.5 Materials;
2.32.25.8.6 Parts;
2.32.25.8.7 Handling; and
2.32.25.8.8 Troubleshooting time.

2.32.26 **Forms**: The County's forms will be accepted by the Contractor if all of the above information is included. Electronic submittal may be used if available between the Contractor and County.

2.32.27 **Return of Parts**: When returning defective parts to the Contractor, the County shall tag each part with the following:

2.32.27.1 Bus number and VIN;
2.32.27.2 Claim number
2.32.27.3 Part number; and
2.32.27.4 Serial number (if available).

2.32.28 **Timeframe**: Each claim must be submitted no more than thirty (30) days from the date of failure and/or repair, whichever is later. All defective parts must be returned to the Contractor, when requested, no more than forty-five (45) days from date of request.

2.32.29 **Reimbursements**: Reimbursements are to be transmitted to the following address:

Central Maryland Regional Transit
312 Marshall Ave., Suite 1000
Laurel, Maryland 20707

2.32.30 Preventative and Scheduled Maintenance:

2.32.30.1 **Bus and Charging Station Maintenance**: The contractor shall provide one–year of dedicated, on-site maintenance for the routine maintenance and repair of the bus and all associated charging equipment (both on-route and depot charges) for the first full year of bus operation. The provided service and maintenance should be sufficient to ensure consistent operation and maximum availability of the system when operating the bus and charging equipment according to the Design Operating Profile.

2.32.30.2 This service shall include all maintenance required or recommended by the equipment and component manufacturers and all work that is normally provided by current industry best practice.

2.32.30.3 A written maintenance plan and training must be provided to the County prior to acceptance. The plan shall include at a minimum a 52 week preventative and scheduled maintenance and long-term capital rehab / replacement plan for the life of the system.

2.32.30.4 The Contractor shall maintain a clean facility and shall dispose off-site of all waste material in an environmentally responsible and legal manner, being compliant with the County's ESMS. Documentation of proper disposal shall be provided to the County. This material will include but not be limited to oil, used filters, desiccant, and dryer and filter condensate.

2.32.30.5 The Contractor shall maintain detailed records of all inspections, calibrations, tests, maintenance and repairs. Information shall be provided to the County on a timely basis

2.32.31 **Optional On-going Inductive Charging System Maintenance**:

2.32.31.1 The Contractor shall provide optional pricing for the routine service, maintenance and repair of the Inductive Charging System, including the onboard and stationary components. The maintenance renewal options shall be divided among year 2 and year 3. The service/maintenance contract should be sufficient to ensure consistent operation and maximum availability of the system when operating according to the Design Operating Profile.

2.32.31.2 The maintenance renewal options shall include all maintenance required or recommended by the equipment and component manufacturers and all work that is normally provided by current industry best practice.

2.32.31.3 The County will use its own staff, or contract staff, to provide weekly inspections as required and as documented in the maintenance plan.

2.32.31.4 The Contractor shall maintain detailed records of all inspections, calibrations, tests, maintenance and repairs. Information shall be provided to the County on a timely basis

2.32.31.5 All parts that fail or are no longer covered by Warranty and shall be included in the cost of the contract such that the County will have no costs beyond the maintenance program charge.

2.32.31.6 Any scheduled major component replacements must be identified in a separate line item in the year of occurrence and only paid out upon the replacement.

2.32.32 **Maintenance Materials and Licenses**:

2.32.32.1 The Contractor shall supply all parts and consumables included within the cost of the contract.

2.32.32.2 The Contractor shall maintain an inventory of all required parts including consumables and major repair parts during the term of this contract.

2.32.32.3 The County, or its designee, will pay the cost of all electric power, water, and communications to the station.

2.32.32.4 The County, or its designee, will provide insurance on the property. Contractor will provide other insurance as indicated elsewhere in this document.

2.32.32.5 The Contractor shall keep all operating permits current. The Contractor shall at their own expense provide any documentation and/or testing required and pay any fees required for these permits.

2.32.32.6 The Contractor shall pay any upgrade or annual license fees as required to keep all copies of software current.

2.32.33 **Unscheduled Repairs**: The Contractor is responsible for monitoring the performance of the system and be automatically notified when the system requires maintenance or becomes non-operational. Any non-emergency repairs can be scheduled as needed.

2.32.33.1 The Contractor shall provide a 60 minute call back and four hour on site response time (from time of a fault shutdown being transmitted either electronically or by phone whichever occurs first). At no time shall the equipment deliver less than 75 percent of firm capacity for more than 12 hours.

2.32.33.2 If the Contractor does not respond within the 1 to 4 hours, the County may have the problem repaired at their discretion and charge the Contractor back the repair costs with a 15% markup against the monthly service billing.

2.32.33.3 Callouts that are the result of the County actions shall be charged to the County at regular time rates as proposed herein with no additional charges for overtime, premium, time, equipment or mileage charges.

2.32.33.4 Cost of maintenance program shall be invoiced monthly.

2.32.34 **Performance Reporting**: The Contractor shall be responsible for monitoring the performance of the EVSE and reporting the condition to the County on a monthly basis. The report should include any recommendations for improvements that improve the charging of the coaches or reduce the overall operational costs during the duration of the contract.

2.33 **Quality Assurance**:

2.33.1 **Organization Establishment**: The Contractor shall establish and maintain an effective in-plant quality assurance organization. It shall be a specifically defined organization and should be directly responsible to the Contractor's top management.

2.33.2 **Control**: The quality assurance organization shall exercise quality control over all phases of production, from initiation of design through manufacture and preparation for delivery. The organization shall also control the quality of supplied articles.

2.33.3 **Authority and Responsibility**: The quality assurance organization shall have the authority and responsibility for reliability, quality control, inspection planning, establishment of the quality control system, and acceptance/rejection of materials and manufactured articles in the production of the transit buses.

2.33.4 **Minimum Functions**: The quality assurance organization shall include the following minimum functions:

2.33.4.1 Work instructions: The quality assurance organization shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.

2.33.4.2 Records maintenance: The quality assurance organization shall maintain and use records and data essential to the effective operation of its program. These records and data shall be available for review by the resident inspectors. Inspection and test records for this procurement shall be available for a minimum of one year after inspections and tests are completed.

2.33.4.3 Corrective action: The quality assurance organization shall detect and promptly ensure correction of any conditions that may result in the production of defective transit buses. These conditions may occur in designs, purchases, manufacture, tests or operations that culminate in defective supplies, services, facilities, technical data or standards.

2.33.5 **Basic Standards and Facilities**: The following standards and facilities shall be basic in the quality assurance process:

2.33.5.1 Configuration control: The Contractor shall maintain drawings, assembly procedures, and other documentation that completely describe a qualified bus that meets all of the options and special requirements of this procurement. The quality assurance organization shall verify that each transit bus is manufactured in accordance with these controlled drawings, procedures, and documentation.

2.33.5.2 Measuring and testing facilities: The Contractor shall provide and maintain the necessary gauges and other measuring and testing devices for use by the quality assurance organization to verify that the buses conform to all specification requirements. These devices shall be calibrated at established periods against certified measurement standards that have known, valid relationships to national standards.

2.33.5.3 Production tooling as media of inspection: When production jigs, fixtures, tooling masters, templates, patterns, and other devices are used as media of inspection, they shall be proved for accuracy at formally established intervals and adjusted, replaced, or repaired as required to maintain quality.

2.33.5.4 Equipment use by resident inspectors: The Contractor's gauges and other measuring and testing devices shall be made available for use by the resident inspectors to verify that the buses conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy.

2.33.6 **Maintenance of Control**: The Contractor shall maintain quality control of purchases:

2.33.6.1 **Supplier Control**: The Contractor shall require that each Supplier maintains a quality control program for the services and supplies that it

provides. The Contractor's quality assurance organization shall inspect and test materials provided by Suppliers for conformance to specification requirements. Materials that have been inspected, tested, and approved shall be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls shall be established to prevent inadvertent use of nonconforming materials.

2.33.6.2 **Purchasing Data**: The Contractor shall verify that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on transit buses.

2.33.7 **Manufacturing Control**:

2.33.7.1 Controlled conditions: The Contractor shall ensure that all basic production operations, as well as all other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented Work instructions, adequate production equipment and special working environments if necessary.

2.33.7.2 Completed items: A system for final inspection and test of completed transit buses shall be provided by the quality assurance organization. It shall measure the overall quality of each completed bus.

2.33.7.3 Nonconforming materials: The quality assurance organization shall monitor the Contractor's system for controlling nonconforming materials. The system shall include procedures for identification, segregation and disposition.

2.33.7.4 Statistical techniques: Statistical analysis, tests and other quality control procedures may be used when appropriate in the quality assurance processes.

2.33.7.5 Inspection status: A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit buses. Identification may include cards, tags or other normal quality control devices.

2.33.8 **Inspection System**: The quality assurance organization shall establish, maintain and periodically audit a fully documented inspection system. The system shall prescribe inspection and test of materials, Work in process and completed articles. As a minimum, it shall include the following controls:

2.33.8.1 **Inspection Personnel**: Sufficient trained inspectors shall be used to ensure that all materials, components and assemblies are inspected for conformance with the qualified bus design.

2.33.8.2 **Inspection Records**: Acceptance, rework or rejection identification shall be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions shall be identified. Articles that have been reworked to specified drawing configurations shall not require special identification. Articles rejected as unsuitable or scrap shall be plainly marked and controlled to prevent installation on the bus. Articles that become obsolete as a result of engineering changes or other actions shall be controlled to prevent unauthorized assembly or installation. Unusable articles shall be isolated and then

scrapped. Discrepancies noted by the Contractor or resident inspectors during assembly shall be entered by the inspection personnel on a record that accompanies the major component, subassembly, assembly, or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures or other conditions that cause articles to be in nonconformity with the requirements of the Contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the County shall approve the modification, repair or method of correction to the extent that the Contract specifications are affected.

2.33.8.3 **Quality Assurance Audits**: The quality assurance organization shall establish and maintain a quality control audit program. Records of this program shall be subject to review by the County.

2.33.9 **Inspection Stations**: Inspection stations shall be at the best locations to provide for the Work content and characteristics to be inspected. Stations shall provide the facilities and equipment to inspect structural, electrical, hydraulic and other components and assemblies for compliance with the design requirements. Stations shall also be at the best locations to inspect or test characteristics before they are concealed by subsequent fabrication or assembly operations. These locations shall minimally include underbody structure completion, body framing completion, body prior to paint preparation, water test, engine installation completion, underbody dress-up and completion, bus prior to final paint touchup, bus prior to road test and bus final road test completion.

2.33.10 **Resident Inspectors**: The County shall be represented at the Contractor's plant by resident inspectors. Resident inspectors may be County employees or outside contractors. The County shall provide the identity of each inspector and shall also identify their level of authority in writing. They shall monitor, in the Contractor's plant, the manufacture of transit buses built under the procurement. The presence of these resident inspectors in the plant shall not relieve the Contractor of its responsibility to meet all of the requirements of this procurement. The County shall designate a primary resident inspector, whose duties and responsibilities are delineated in "Pre-Production Meetings," "Authority" and "Pre-Delivery Tests," below. Contractor and resident inspector relations shall be governed by the Guidelines included in Attachments L and M. The County and/or its designees are able to participate in project related meetings with the inspectors, the contractors, the sub-contractors, etc., as appropriate at any time during the project.

2.33.11 **Pre-Production Meetings**: The primary resident inspector may participate in design review and pre-production meetings with the County. At these meetings, the configuration of the buses and the manufacturing processes shall be finalized, and all Contract documentation provided to the inspector. No less than thirty (30) days prior to the beginning of bus manufacture, the primary resident inspector may meet with the Contractor's quality assurance manager and may conduct a pre-production audit meeting. They shall review the inspection procedures and finalize inspection checklists. The resident inspectors may begin monitoring bus construction activities two weeks prior to the start of bus fabrication.

2.33.12 **Authority**:

2.33.12.1 Records and data maintained by the quality assurance organization shall be available for review by the resident inspectors. Inspection and test records for this procurement shall be available for a minimum of one year after inspections and tests are completed.

2.33.12.2 The Contractor's gauges and other measuring and testing devices shall be made available for use by the resident inspectors to verify that the buses conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy.

2.33.12.3 Discrepancies noted by the resident inspector during assembly shall be entered by the Contractor's inspection personnel on a record that accompanies the major component, subassembly, assembly or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures or other conditions that cause articles to be in nonconformity with the requirements of the Contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, the County shall approve the modification, repair or method of correction to the extent that the Contract specifications are affected.

2.33.12.4 The primary resident inspector shall remain in the Contractor's plant for the duration of bus assembly Work under this Contract. Only the primary resident inspector or designee shall be authorized to release the buses for delivery. The resident inspectors shall be authorized to approve the pre-delivery acceptance tests. Upon request to the quality assurance supervisors, the resident inspectors shall have access to the Contractor's quality assurance files related to this procurement. These files shall include drawings, assembly procedures, material standards, parts lists, inspection processing and reports, and records of Defects.

2.33.13 **Support Provisions**: The Contractor shall provide office space for the resident inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, outside and interplant telephones, Internet access, file cabinet and chairs.

2.33.14 **Compliance with Safety Requirements**: At the time of the Pre-Production meeting, the Contractor shall provide all safety and other operational restrictions that govern the Contractor's facilities. These issues will be discussed and the parties will agree which rules/restrictions will govern the County's inspector(s) and any other County representatives during the course of the Contract.

2.33.15 **Acceptance Tests**: Fully documented tests shall be conducted on each production bus following manufacture to determine its acceptance to the County. These acceptance tests shall include pre-delivery inspections and testing by the Contractor and inspections and testing by the County after the buses have been delivered.

2.33.16 **Pre-Delivery Tests**: The Contractor shall conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to the County. These pre-delivery tests shall include visual and measured inspections, as well as testing the total bus operation and charging. The tests shall be conducted and documented in accordance with written test plans approved by the County.

2.33.16.1 Additional tests may be conducted at the Contractor's discretion to ensure that the completed buses have attained the required quality and have met the requirements in Section 6: Technical Specifications. The County may, prior to commencement of production, demand that the Contractor demonstrate compliance with any requirement in that section if there is evidence that prior tests have been invalidated by the

Contractor's change of Supplier or change in manufacturing process. Such demonstration shall be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing shall be recorded on appropriate test forms provided by the Contractor and shall be conducted before acceptance of the bus.

2.33.16.2 The pre-delivery tests shall be scheduled and conducted with thirty (30) days' notice so that they may be witnessed by the resident inspectors, who may accept or reject the results of the tests. The results of pre- delivery tests, and any other tests, shall be filed with the assembly inspection records for each bus. The underfloor equipment shall be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold or elevated platform shall be provided by the Contractor to easily and safely inspect bus roofs. Delivery of each bus shall require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each bus.

2.33.17 **Visual and Measured Inspections**: Visual and measured inspections shall be conducted with the bus in a static condition. The purpose of the inspection testing includes verification of overall dimension and weight requirements, that required components are included and are ready for operation, and that components and subsystems designed to operate with the bus in a static condition do function as designed.

2.33.18 **Total Bus Operation**: Total bus operation shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the bus as a system and to verify the functional operation of the subsystems that can be operated only while the bus is in motion. Each bus shall be driven for a minimum of one hundred (100) miles during the road tests. If requested, computerized diagnostic printouts or electronic files showing the performance of each bus shall be produced and provided to the County. Observed Defects shall be recorded on the test forms. The bus shall be retested when Defects are corrected and adjustments are made. This process shall continue until Defects or required adjustments are no longer detected.

2.33.19 **Charging Station Requirements**: The subject acquisition is for the purpose of a system, to include buses and charging infrastructure, consequently this Quality Assurance guideline shall apply to deliverables in both areas. This project is assumed to be a sequence of steps and milestones such that each is accompanied by producing products, testing and validation.

2.33.20 **Depot Charging Station**: The Contractor shall produce and demonstrate charging equipment that are proposed for use at the depot charging station. Demonstration's shall take place at the bus manufacturer's facility and will include all modes of charging connectivity with the bus (i.e., primary charge interface, manual charge interface, etc.). Manufacturer shall validate connect/disconnect times, charging times, rates, etc.

2.33.21 **On Route Charging Equipment**: The Contractor shall produce and demonstrate on route charging equipment that is proposed for use at the on route charging stations. Demonstration's shall take place at the bus manufacturer's facility and will include all modes of charging connectivity with the bus (i.e., primary charge interface, manual charge interface, etc.). Manufacturer shall validate connect/disconnect times, charging times, rates, etc.

2.33.22 **Parts Availability Guarantee**: The Contractor hereby guarantees to provide, within reasonable periods of time, the spare parts, software and all equipment necessary to maintain and repair the buses supplied under this Contract for a period of at least twelve (12) years after the date of acceptance. Parts shall be interchangeable with the original equipment and shall be manufactured in accordance with the quality assurance provisions of this Contract. Prices shall not exceed the Contractor's then-current published catalog prices.

2.33.22.1 Where the parts ordered by the County are not received within two working days of the agreed-upon time and date and a bus procured under this Contract is out of service due to the lack of said ordered parts, then the Contractor shall provide the County, within eight (8) hours of the County's verbal or written request, the original Suppliers' and/or manufacturers' parts numbers, company names, addresses, telephone numbers and contact persons' names for all of the specific parts not received by the County.

2.33.22.2 Where the Contractor fails to honor this parts guarantee or parts ordered by the County are not received within thirty (30) days of the agreed-upon delivery date, then the Contractor shall provide to County, within seven (7) days of the County's verbal or written request, the design and manufacturing documentation for those parts manufactured by the Contractor and the original Suppliers' and/or manufacturers' parts numbers, company names, addresses, telephone numbers and contact persons' names for all of the specific parts not received by the County. The Contractor's design and manufacturing documentation provided to the County shall be for its sole use in regard to the buses procured under this Contract and for no other purpose.

2.33.23 **Testing of New Bus Models**: The Contractor agrees to comply with 49 USC A 5323(c) and FTA's implementing regulation at 49 CFR Part 665 and shall perform the following:

2.33.23.1 A manufacturer of a new bus model or a bus produced with a major change in components or configuration shall provide a copy of the final test report to the recipient at a point in the procurement process specified by the recipient, which will be prior to the recipient's final acceptance of the first vehicle.

2.33.23.2 A manufacturer who releases a report under Paragraph 1 above shall provide notice to the operator of the testing facility that the report is available to the public.

2.33.23.3 If the manufacturer represents that the vehicle was previously tested, the vehicle being sold should have the identical configuration and major components as the vehicle in the test report, which must be provided to the recipient prior to recipient's final acceptance of the first vehicle. If the configuration or components are not identical, the manufacturer shall provide a description of the change and the manufacturer's basis for concluding that it is not a major change requiring additional testing.

2.33.23.4 If the manufacturer represents that the vehicle is "grandfathered" (has been used in mass transit service in the United States before October 1, 1988, and is currently being produced without a major change in configuration or components), the manufacturer shall provide the name and address of the recipient of such a vehicle and the details of that vehicle's configuration and major components.

2.33.23.5 If the manufacturer is in the middle of the tests required to comply with this contract, the manufacturer must make all data available to the County as it becomes available for review.

2.33.24 **Pre-Award and Post-Delivery Audits**: The Contractor agrees to comply with 49 USC § 5323(l) and FTA's implementing regulation at 49 CFR Part 663 and to submit the following certifications:

2.33.24.1 **Buy America requirements**: The Contractor shall complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the recommended Bidder/Proposer certifies compliance with Buy America, it shall submit documentation that lists (1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and (2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly. This list shall be provided prior to the production of the buses.

2.33.24.2 **Solicitation Specification Requirements**: The Contractor shall submit evidence that it will be capable of meeting the bid specifications.

2.33.24.3 **Federal Motor Vehicle Safety Standards (FMVSS)**: The Contractor shall submit (1) manufacturer's FMVSS self-certification form provided in Attachment J, Federal Motor Vehicle Safety Standards, that the vehicle complies with relevant FMVSS or (2) manufacturer's certified statement that the contracted buses will not be subject to FMVSS regulations.

2.33.24.4 **Repairs After Non-Acceptance**: The Contractor, or its designated representative, shall perform the repairs after non-acceptance. The County will not take responsibility to correct Defects.

2.33.25 **Repairs by Contractor**: After non-acceptance of the bus, the Contractor must begin Work within five (5) working days after receiving notification from the County of failure of acceptance tests. The County shall make the bus available to complete repairs timely with the Contractor repair schedule. The Contractor shall provide, at its own expense, all spare parts, tools and space required to complete the repairs. At the County's option, the Contractor may be required to remove the bus from the County's property while repairs are being made. If the bus is removed from the County's property, repair procedures must be diligently pursued by the Contractor's representatives, and the Contractor shall assume risk of loss while the bus is under its control.

3 PRE-PROPOSAL CONFERENCE:

3.1 A pre-proposal conference will be held in the Purchasing Conference Room, Gateway Building, 6751 Columbia Gateway Drive, Suite 501, Columbia, Maryland 21046 on the date and time specified in Document A to discuss objectives and answer questions relating to this solicitation. Contractor's attendance is not required but is strongly encouraged. Additionally, attendance may facilitate the Contractor's understanding and ability to meet the County's Equal Business Opportunity goals as outlined in Section I.

3.2 It is recommended that Contractors read the solicitation prior to attending the conference and bring a copy to the conference.

3.3 In order to assure adequate seating at the pre-proposal conference, please confirm attendance by emailing Julie Spencer at jspencer@howardcountymd.gov and referencing this solicitation and number.

3.4 If there is a need for language interpretation and/or other special accommodations, please advise Julie Spencer at jspencer@howardcountymd.gov so that reasonable efforts may be made to provide special accommodations.

4 INQUIRIES AND ADDENDA:

4.1 The Buyer in the Issuing Office is the sole point of contact for this solicitation. Questions must be addressed in writing to the Buyer and delivered no later than November 21, 2014.

4.2 Addenda to solicitations often occur prior to the proposal opening, sometimes within a few hours of the opening. It is the potential Contractor's responsibility to visit the Office of Purchasing website at www.howardcountymd.gov/purchasing to obtain Addenda.

5 CONTRACTOR'S QUALIFICATIONS:

5.1 Contractors must be engaged in the furnishing and maintenance of electric transit buses and charging stations and must have been actively engaged in this type of work for a period of no less than five years. The experience of owner(s) may be imputed to a newly formed company/contractor provided the owner(s) has/have at least five years of demonstrated experience of reliability and meets the criteria set forth herein.

5.2 The County reserves the right to inspect the Contractor's equipment and to perform such investigations as may be deemed necessary to insure that competent personnel and management will be utilized in the performance of the Agreement.

5.3 In accordance with Howard County Code Sec. 4.117 (a) (4), the quality of performance of previous contracts or services shall be considered in determining the lowest responsive and responsible bidder. Quality of performance may be determined through contracts or services provided to the County or to other entities. Quality of performance to other entities will be determined from reference checks when references are required. The determination of quality performance includes the Contractor's history of reasonable and cooperative behavior and commitment to customer satisfaction and the Contractor's businesslike concern for the interests of the customer. The County reserves the right to reject any bid deemed not responsible or non-responsive.

6 BACKGROUND CHECKS AND INVESTIGATIONS:

6.1 If a Contractors' employees are on-site in County buildings working without a County escort each employee of the Contractor shall agree to a background check or investigation consisting of national criminal database search covering misdemeanors and felonies and the release of that information to the County in the event that it is required.

6.2 The Contractor shall assume the cost to have background checks done for each employee assigned to each facility. The County may bill the Contractor $100 for each standard background check. Public safety buildings require a higher level of security and an in-depth background checks referred to as "investigations". The County may bill the Contractor $250 for each in-depth background investigation. This fee, when billed to the Contractor, shall be payable to the County prior to the check or investigation being conducted.

6.3 The background checks or investigations shall include all employees, new employees, subcontractors and replacement employees to be done prior to assignment of a building. The checks or investigations will be conducted by the Office of the Sheriff. The Contractor shall submit the proper forms (provided by the County) to the Office of the Sheriff.

6.4 The Contractor shall not assign any individual convicted of the following offenses which shall include, but are not limited to: Abduction, Homicide, Rape, Aggravated Assault, Sex Offender, Assault with Intent to Murder, or Assault with Intent to Rob.

6.5 The Contractor shall not assign any individual convicted, or having incomplete probation for the following offenses which shall include, but are not limited to: Burglary, Breaking and Entering,

Carrying or Wearing a Weapon, Destruction of Property, Possession of a Controlled Dangerous Substance with Intent to Distribute, Explosives, Kidnapping, Theft/Larceny, Maiming, Manslaughter, Sexual Assault, Hate Crimes, Robbery, and Distribution of a Controlled Substance.

6.6 The Contractor reserves the right to seek exception to the above guidelines governing acceptability for assignment to the facility by providing documented specifics pertaining to convictions of the employee in question. The County will, at its sole discretion, accept or reject the requested exception.

7 AGREEMENT PERIOD: The Agreement period shall be for one year commencing on or about February 1, 2015 after approval and proper execution of the Agreement documents, with an electric charging system annual maintenance renewal option for two additional years in one-year increments, exercisable at the sole discretion of the County Purchasing Agent or Designee.

8 ESTIMATED CONTRACT VALUE: The estimated contract value group for this contract is F as defined by the schedule below:

A - $30,000 to $75,000
B - $75,001 to $100,000
C - $100,001 to $250,000
D - 250,001 to $500,000
E - $500,001 to $1,000,000
F - Over $1,000,000

9 INSURANCE: The Contractor will be required to purchase and maintain during the life of the Agreement, including any subsequent renewal terms, Commercial General Liability Insurance, Automobile Liability Insurance, and Worker's Compensation Insurance with limits of not less than those set forth below:

9.1 Commercial General Liability Insurance: Combined Single Liability limits of $1,000,000 each occurrence and $1,000,000 aggregate naming, “Howard County, Maryland, its officials, employees, agents and volunteers” as the Certificate Holder and an Additional Insured.

9.2 Automobile Liability Insurance: Combined Single Liability limit of $1,000,000 any one accident.

9.3 Worker's Compensation Insurance: Statutory coverage for Maryland jurisdiction, including Employer's Liability coverage, with a limit of at least $100,000.

9.4 The Contractor shall assure that all subcontractors or independent contractors performing services in accordance with this solicitation carry identical insurance coverage as required of the Contractor, either individually or as an Additional Insured on the policies of the Contractor. Exceptions may be made only with the approval of the County. The Contractor shall indemnify the County for any uninsured losses relating to contractual services involving subcontractors, including workers' compensation claims.

9.5 The Contractor shall provide the County with Certificates of Insurance within ten days of bid award notification, evidencing the coverages required above. Such certificates shall provide that the County be given at least 60 days prior written notice of any cancellation of, intention to not renew, or material change in such coverage. The Contractor must provide Certificates of Insurance before commencing work in connection with the Agreement. “Howard County, Maryland, its officials, employees, agents and volunteers” as Certificate Holder and as Additional Insured must be shown on the certificate.

9.6 The providing of any insurance required herein does not relieve the Contractor of any of the responsibilities or obligations assumed by the Contractor in the Agreement awarded or for which the Contractor may be liable by law or otherwise.

9.7 Failure to provide and continue to enforce such insurance as required above shall be deemed a material breach of the Agreement and shall operate as an immediate termination thereof.

9.8 Failure to comply with this requirement at any time during the initial term and any subsequent renewals may be sufficient cause for termination for default. A violation of this law is a Class A civil offense and, in addition to a fine, the County Purchasing Agent may suspend or debar the violator under Sec. 4.117.

10 METHOD OF ORDERING:

10.1 Purchase Orders will be issued from time to time for such quantities as may be required by the County. Purchase Orders issued against the Agreement, even if not completed within the term of the Agreement, shall continue to be bound by the terms and conditions until completion.

10.2 Small purchases may also be made by the County's procurement card (currently Visa). The Contractor agrees to accept the card for such quantities as may be required by the County. Contractors are prohibited from charging additional fees over and above their bid prices to process payments on procurement cards.

11 EVALUATION OF OFFERS:

11.1 The County intends to make award to the responsible Contractor whose proposal represents the best value to the County. Proposals will be evaluated in two phases; the first based on the technical and price submittals and the second on the oral discussions.

11.2 The first phase will be evaluated based on the following criteria listed in order of importance:

11.2.1 Technical Design / Coach Operational Considerations including**:**

11.2.1.1 General Characteristics of Coach;
11.2.1.2 Ability to Match Stated Service Requirements of Existing Buses on Existing Route;
11.2.1.3 Operational Issues (turning radius, smoothness of ride, start/stopping etc.);
11.2.1.4 Propulsion System (Motor, energy storage, BMS, etc.);
11.2.1.5 Electrical wiring system design, reliability, and serviceability;
11.2.1.6 Operator Considerations / Driver Area;
11.2.1.7 Other Performance (fuel economy, etc.);
11.2.1.8 Overall Appearance (look & feel; flexibility for design);
11.2.1.9 Passenger Boarding (floor height, kneeling, etc.);
11.2.1.10 Passenger Amenities (seating, standing room, height of ceiling etc.); and
11.2.1.11 ADA Accessibility (w/chair ramp, aisle ways, etc.).

11.2.2 Technical Design/Charging Station Operational Considerations including:

11.2.2.1 General Characteristics of Station Design;
11.2.2.2 Environmental Considerations (impact to our sites, size, etc.);
11.2.2.3 Flexibility / Standardized Technology; and
11.2.2.4 Operational Considerations (impact on service).

11.2.3 Experience of Firm and Response to Solution including:

11.2.3.1 Prime Contractor Company Background / Qualifications as a Bus manufacturer;
11.2.3.2 References and Previous Projects Completed;
11.2.3.3 Coach Design Experience;
11.2.3.4 Propulsion System Experience;
11.2.3.5 All Electric Bus Experience (# of coaches built, Altoona status); and
11.2.3.6 Major Sub-Contractor background / Qualifications.

11.2.4 Maintainability / Product Support including:

11.2.4.1 Maintenance Familiarity / Training required;
11.2.4.2 Parts Familiarity;
11.2.4.3 Maintenance Access;

11.2.4.4 Samples of Manuals / Parts Catalogue / Schematics;
11.2.4.5 Parts Support (location, parts availability etc.);
11.2.4.6 Technical Support (engineers, field service, etc.);
11.2.4.7 Warranty; and
11.2.4.8 Training.

11.2.5 Overall Proposal including:

11.2.5.1 Understanding of the Project;
11.2.5.2 Product Demonstration / Responsiveness;
11.2.5.3 Ability to Meet the Schedule; and
11.2.5.4 Identified risks associated with this project.

11.2.6 Pricing & Life Cycle Costs including:

11.2.6.1 Cost of Coaches;
11.2.6.2 Projected Life Cycle Cost of Propulsion Components;
11.2.6.3 Projected Life Cycle of Batteries;
11.2.6.4 Cost of Charging Station;
11.2.6.5 Projected Life Cycle Costs of Station; and
11.2.6.6 Charging Equipment Maintenance.

11.3 After identifying the short list of the most qualified Contractor(s) based on the evaluation criteria, representative(s) may be required to clarify their proposals through presentations and/or oral discussions.

11.4 The County may enter into negotiations with the Contractors and invite best and final offers as deemed to be in the best interest of the County. Negotiations may be in the form of face-to-face, telephone, facsimile, email or written communications, or any combination thereof, at the County's sole discretion.

11.5 Contractors are strongly advised not to prepare their proposal submissions based on any assumption or understanding that negotiations will take place. Contractors are advised to respond to this solicitation fully and with forthrightness at the time of submission.

11.6 Following the submittals of proposals, Contractors are strongly cautioned not to contact elected officials or members of the evaluation team regarding the selection process. Inappropriate efforts to lobby or influence individuals, or Contractors involved in this selection may result in dismissal from further consideration, at the County's sole discretion.

12 BILLING AND PAYMENT:

12.1 The Contractor shall submit separate invoices for each Purchase Order issued. Invoices shall be sent to Office of Transportation, 3430 Court House Drive, Ellicott City, Maryland 21043. Invoices in the proper form and approved by the County shall be paid by the County within 30 days of receipt. Invoices without the necessary information may be returned for correction prior to payment.

12.2 Each invoice shall include the following information:

12.2.1 Contractor's name;
12.2.2 Address;
12.2.3 Federal tax identification number;
12.2.4 Contract number, if applicable (i.e., 44XXXXXXXX);
12.2.5 Purchase Order number (i.e., 2XXXXXXXXX);
12.2.6 Contract line number;
12.2.7 Unit price and extended price (unit price must match a contract line); and
12.2.8 Description of goods provided and/or services performed.

12.3 The County reserves the right to make payments on Visa procurement cards when orders are placed using procurement cards as indicated in Method of Ordering above. Contractors are not permitted to charge the County additional fees over and above their bid prices to process payments on procurement cards.

12.4 The County reserves the right to make payments via electronic funds transfer (a.k.a. ACH) on Agreements for which this payment vehicle is appropriate.

12.5 Payment shall be made upon receipt of proper invoice from Contractor and authorized by the County.

12.6 All amounts, costs, or prices referred to herein pursuant to this Agreement shall be United States of America currency.

12.7 Please provide a sample invoice that complies with paragraph "Billing and Payment" with response. See Exhibit II for sample invoice.

12.8 The proper form of County invoices requires that the necessary information be included on all invoices. Invoices without the necessary information may be returned for correction prior to payment. The County reserves the right to approve invoices, in its sole discretion, and to request such detail and additional information as the County, in its discretion deems appropriate.

SECTION E

SUBMISSION REQUIREMENTS

1 INSTRUCTIONS:

1.1 All proposals must be clearly identified on the front of the envelope or top of the carton with the solicitation number, title of the solicitation and the due date and time. TECHNICAL AND PRICE PROPOSALS SHALL BE IN SEPARATE, SEALED ENVELOPES.

1.2 All proposals must be signed by an authorized officer or agent of the Contractor submitting the proposal and delivered in sealed envelopes or cartons to the Issuing Office no later than the time and date indicated. Proposals received after the time and date indicated will not be accepted or considered.

1.3 The submission of a proposal shall be considered an agreement to all the terms, conditions, and specifications provided herein and in the various bid documents, unless specifically noted otherwise in the proposal.

1.4 Each proposal shall be accompanied by the Affidavit regarding price fixing, gratuities, bribery, and discriminatory employment practices in accordance with Section E.1.c. (3)(b) of the Howard County Purchasing Manual. When the Contractor is a corporation, a duly authorized representative of said corporation shall execute the Affidavit. The Affidavit is provided in the solicitation package.

1.5 The Foreign Services Disclosure Form must accompany proposal for construction-related services, architectural services, engineering services and energy performance contract services of $2 million or more. Section 12-111 of the Maryland State Finance and Procurement Article requires bidders to local governments to make certain disclosures regarding plans, at the time the bid is submitted, to perform any services under the contract outside the United States. When applicable, the Foreign Services Disclosure form is provided in the solicitation package.

1.6 If a discrepancy in or omission from the specifications is found, or if a Contractor is in doubt as to their meaning, or feels that the specifications are discriminatory, the Contractor shall notify the Buyer in the Issuing Office in writing not later than ten days prior to the scheduled proposal opening. Exceptions taken do not obligate the County to change the specifications. The Issuing Office will notify all Contractors of any changes, additions or deletions to the specifications by Addenda posted on the Office of Purchasing web site (www.howardcountymd.gov/purchasing).

1.7 The County will assume no responsibility for oral instructions or suggestions. All official correspondence in regard to the specifications shall be directed to and will be issued by the Issuing Office.

2 PROPOSAL DOCUMENTS: Contractors shall submit one original clearly marked, and five copies of the complete proposal, to the Issuing Office no later than the opening date and time specified in Section A. Failure to return required documents may be cause for rejection of the proposal. This solicitation requires the return of the following documents:

2.1 Technical Submittal

2.1.1 Section F, (Technical Proposal Cover Page)
2.1.2 Section F, (Contract Qualification Information)
2.1.3 Section G, (Affidavit)
2.1.4 Exhibit III, (Federal Requirements)
2.1.5 Exhibit IV, (Bus and Charge Station Technical Specification Form)
2.1.6 Exhibit V, (Minimum Milestones and Schedule Form)
2.1.7 Exhibit VI, (Federal Motor Vehicle Safety Standards Form)
2.1.8 Exhibit VII, (New Bus Manufacturing Inspection Guidelines)
2.1.9 Exhibit VIII, (New Charging Station Inspection Guidelines)
2.1.10 Exhibit IX, (Contractor Service and Parts Support Data)

2.1.10 Sufficient detail that demonstrates experience and knowledge of the services to be provided that minimally includes:

2.1.10.1 Clearly describe the operational strategy for the proposed buses and charging infrastructure including notional bus blocking scenario, on-route charge time, and total time on-route, to optimally meet the existing Green Route service demands shown herein.

2.1.10.2 Describe the approach to completing the tasks specified in the Scope of Work. Understanding there are two major elements to this project (bus & charging equipment) – these areas must easily be separated for evaluation.

2.1.10.3 Outline sequentially the activities that would be undertaken in completing the tasks and specify who would perform them.

2.1.10.4 A narrative of the proposed propulsion system with test data and a description of how it meets the County's requirements.

2.1.10.5 A complete description of the charging systems (including anticipated AC energy consumption for buses operating on the specified operating profile, power factors, harmonic distortion, and accuracy of charge parameters).

2.1.11 A plan which clearly identifies the intended procedure for the integration, test, and validation of the inductive charging system in the bus. This plan should include design integration and physical integration methods for the inductive charging system with the bus energy storage system and battery management system. The plan should clearly describe validation procedures for the integration of these systems. The plan should also describe all intended subsystem bench testing for the propulsion and/or charging system.

2.1.11.1 Furnish a milestone schedule for completing the tasks in terms of elapsed weeks from the project commencement date to projected completion. The detailed schedule must include the Minimum Milestones and Schedule defined in Attachment I.

2.1.11.2 Identify methods that the Proposing Company will use to ensure quality control as well as budget and schedule control for the project.

2.1.11.3 Describe Risk Management procedures used to identify, assess, prioritize, and mitigate project risks, i.e., technical, schedule, budget, personnel, etc. The Proposing Company may also propose procedural or technical enhancements/innovations to the Scope of Work, which do not materially deviate from the objectives or required content of the project.

2.1.12 Maintainability / Product Support: This section of the proposal should present the Proposing Company's plan in supporting the coach and charging station. This is new technology that is still being established, but the proposed project has a requirement of a minimum useful life of 12 years. We anticipate that the contractor has considered how they intend to support and ensure the life of the project. Any history of the equipment in other applications should also be presented in this section. As part of this section, life cycle projections of major components should be presented. The proposing company at a minimum shall provide a narrative & documentation to support:

2.1.12.1 The proposing company must present how they intend to support the coach and station during the warranty period, including engineering and field support. This section should include the plan for training and whether any maintenance / training manuals and material already exist or will be created uniquely for this project. The location of support should also be included.

2.1.12.2 The proposing company should include plan for providing parts, describing location and availability of parts required to support the coach and the charging equipment.

2.1.12.3 Any known maintenance requirements of existing coach & charging equipment must also be presented. If the product is absolutely new and no history or maintenance plans exist, this must be communicated.

2.1.12.4 Bus and Charging Equipment Maintenance Proposal for dedicated, onsite support for 1st year.

2.1.12.5 As options, Inductive Charging System Maintenance Proposal for years 2 and 3.

2.1.12.6 A schedule for major component replacements must be included in this section. This section must include a narrative describing the basis for projected replacement schedule.

2.1.13 Contractor's Experience and Capability: The Contractor shall establish the ability to satisfactorily perform the required work. It is essential that the proposing company identify both the coach & charging station experience as separate elements. The Contractor shall identify both the coach and charging station experience as separate elements. The Contractor shall:

2.1.13.1 Provide a brief profile of the organization including: the types of services offered, the year founded, form of the organization (corporation, partnership, sole proprietorship) number, size and location of offices, and number of employees.

2.1.13.2 Describe its overall experience and past performance in providing services similar to those solicited in this RFP.

2.1.13.3 Provide evidence acceptable to the County that the Contractor has the financial capability to provide the services required in this RFP.

2.1.13.4 Provide a detailed description of its manufacturing capabilities and process, including a detailed description of the proposed facilities where the Work would be done.

2.1.13.5 Provide a short summary of the professional experience (and certifications, licenses, etc.) and achievements of each individual assigned to the Contract. Please also indicate any complaints against them that have been leveled by any regulatory authority, and any corrective actions that have been taken by the Contractor's organization with respect to these individuals.

2.2 Price Submittal

2.2.1 Section F, (Price Proposal Page)

2.2.2 Section H, (Equal Business Opportunity Participation)

2.2.3 Section I, (Wage Rate Requirement for Services Agreements Form)

3 ELECTRONIC AND HARD COPIES: Contractors should submit a CD or flash drive containing the entire, identical hard copy of the proposal along with the hard copies required above. Additionally, it is requested that a separate version, redacted in accordance with Section C, Paragraph 21, be added to the electronic copy.

4 SAMPLE INVOICE: Contractors are required to provide a sample invoice with the proposal response. The sample invoice shall contain the details enumerated in Section D, Paragraph 12.2.

5 BID DEPOSIT: This bid requires the submission of a bid deposit. Acceptable forms of a bid deposit are a certified check, cashier's check, or bid bond. The bid deposit shall be 5% of the total amount proposed, and shall be in accordance with Section C, Paragraph 2. Failure to submit a bid deposit shall be cause for rejection of the bid.

6 EXCEPTIONS: If the Contractor cannot meet the terms, conditions and/or specifications of the solicitation, the Contractor must furnish a statement on company letterhead giving a complete description of any exceptions to the terms, conditions, and specifications. Failure to furnish the statement means that the Contractor agrees to all terms, conditions and specifications. Exceptions taken do not obligate the County to change the terms, conditions and/or specifications. Exceptions to the terms and/or conditions and/or to the County's standard Agreement may be sufficient cause for rejection of the proposal.

SECTION F

TECHNICAL PROPOSAL COVER PAGE

TITLE Electric Bus Project

TO: HOWARD COUNTY OFFICE OF PURCHASING
6751 Columbia Gateway Drive, Suite 501
Columbia, MD 21046

The undersigned agrees to furnish and deliver the above goods and/or services in accordance with the specifications issued for same, and subject to all terms, conditions, and requirements in the solicitation, and in the various bid documents:

COMPANY NAME: _____

FEDERAL TAX IDENTIFICATION NO./SOCIAL SECURITY NO.: _____

ADDRESS: _____
Street City State Zip

TELEPHONE: _____ FAX: _____

EMAIL ADDRESS: _____

REPRESENTATIVE'S NAME: _____

Provide the name and title of the person with legal authority to sign on behalf of the Contractor. If the title of the individual is not "President" or "Vice President", provide verification of the signatory authority with your submittal.

NAME OF COMPANY SIGNATORY (Printed): _____

TITLE OF COMPANY SIGNATORY (Printed): _____

Bid Deposit in the amount of $_____ enclosed. Failure to submit a bid deposit shall be cause for rejection of the proposal.

Howard County prefers to email Purchase Orders when possible, please provide an **EMAIL ADDRESS FOR RECEIPT OF PURCHASE ORDERS**: _____

Is the company a Minority-, Women-, or Disabled-Owned Business Enterprise? ☐ YES ☐ NO
If yes, indicate the type of minority ownership:

☐ African American ☐ Asian American ☐ Disabled ☐ Eskimo
☐ Female ☐ Hispanic ☐ Native American

Is the company certified? If yes, indicate the certification(s) held:
☐ Howard County Government ☐ MD Dept. of Transportation ☐ City of Baltimore ☐ Other

Certification Number(s) and Expiration Date(s): _____

Does the company have a written non-discrimination policy (i.e.: race, creed, religion, handicap, color, sex, national origin, age, occupation, marital status, political opinion, sexual orientation, gender identity/expression, personal appearance, familial status, source of income)? ☐ YES ☐ NO
(The County reserves the right to request such documentation, if desired, at a later date.)

Delivery Time After Receipt of Order: _____
(This delivery time will be considered in determining the award.)

Delivery Terms: F.O.B. Destination, Inside Delivery.
The company will accept Visa procurement cards: ☐ Yes ☐ No
Contractors are not permitted to charge the County any additional fees over and above their bid prices to process payments on procurements cards.

SECTION F

TECHNICAL PROPOSAL COVER PAGE

COMPANY NAME:_____

Payment Terms: (The payment terms shall be considered net 30 days unless otherwise indicated.) _____

Howard County is exempt from all local, state, and federal taxes, and prices stipulated by the Contractor are considered maximum and are not subject to any increase due to any taxes, or any other reason. The County's Tax Exemption Number is 30001219.

☐ We wish to submit a "NO BID" at this time, but request that our company remain on the Contractors list for future solicitations.

THE PERSON SIGNING THE PRICE PAGE MUST INITIAL ANY ALTERATIONS IN FIGURES IN INK.

SIGNATURE: _____ DATE:_____

PRINTED NAME: _____ TITLE:_____

SECTION F

PRICE PROPOSAL COVER PAGE

(Must be submitted separately from the Technical portion of the proposal)

COMPANY NAME:_____

TITLE: Electric Bus Project

NIGP CODE/PRODUCT CODE: 556-20, Mass Transportation – Coach, Transit (Electric)

ITEM NO.	COMMODITY/SERVICE DESCRIPTION	QUANTITY	U/M	UNIT PRICE (2 Decimal Places Only*)	EXTENDED PRICE
1	Bus, Electric, Base Price	3	Each	$_____	$_____
2	Bus, Electric, On-Route Inductive Charging Equipment and Installation For Three Electric Buses	1	Each	$_____	$_____
3	Bus, Electric, Depot-Based Charging Equipment and Installation, For Three Electric Buses	1	Each	$_____	$_____
4	Maintenance Support Package (Year 1), Electric Bus and Charging Equipment	1	Each	$_____	$_____
5	Training, On-Site, Operational and Mechanical, Hourly Rate (Fully Burdened)	200	Hour	$_____	$_____

TOTAL PROPOSAL PRICE $_____

Pricing for the following items is for information purposes only and should not be calculated in the Total Proposal Price:

Optional Charging Equipment Maintenance	**Qty**	**Unit**	**Price**	**Extended**
Maintenance Support Package, Electric Charging Equipment (Year 2)	1	Each		
Maintenance Support Package, Electric Charging Equipment (Year 3)	1	Each		
Recommended Spare Parts:				
Total Recommended Spare Parts				

Warranty Pricing	Standard Warranty (included in base Price)		Extended Warranty		
	Mileage	Duration (Years)	Mileage	Duration (Years)	Price
Propulsion, Motors, Transmissions, Gearing	150,000	3	300,000	6	
Propulsion, Controler, Inverter	150,000	3	300,000	6	
Propulsion, Energy Storage	150,000	3	300,000	6	
HVAC, Hemetic Compressor	100,000	2	150,000	3	
HVAC, Electric Motors/Controller	100,000	2	150,000	3	
Charger	n/a	3	n/a	12	
Charger Interface	n/a	3	n/a	12	
Controller	n/a	3	n/a	12	
Total Extended Warranties					

Capital Item Replacement	Expected Life (Years)	Unit Price	Qty Replace in 12 Years	Total Cost over 12 Years
Coach High Voltage Batteries				
Drive Motors				
Inductive Charging Interface				
Inductive Charging Equipment				
Depot Charging Equipment				
Other Items:				
Total Replacement Costs				

* Please note that prices shall only have **TWO DECIMAL PLACES.** The County's financial system will not allow more than two decimal places, adjust responses accordingly.

INVOICE PROCEDURE FOR SUCCESSFUL CONTRACTORS:

In order to facilitate prompt payment, invoices must contain the above commodity and/or service descriptions and pricing. Invoices failing to contain the required line item detail, including contract line number and unit pricing, may be returned for correction. Please submit a sample invoice with the response.

SIGNATURE: _____ DATE: _____

PRINTED NAME: _____ TITLE: _____

SECTION F

CONTRACTOR'S QUALIFICATION INFORMATION

COMPANY NAME:_____

1. References: Give name, address, and telephone number of owner or manager of three accounts for which Contractor has provided electric transit solutions during the past five years.

1.1. Account Name _____ Contract Completion Date _____

Owner/Manager _____ Telephone _____

Address _____ Email _____

1.2. Account Name _____ Contract Completion Date _____

Owner/Manager _____ Telephone _____

Address _____ Email _____

1.3. Account Name _____ Contract Completion Date _____

Owner/Manager _____ Telephone _____

Address _____ Email _____

2. The Contractor has provided the above services for ____ years. (Note: Five year minimum)

SECTION G

AFFIDAVIT

Must be completed, signed by an officer of the company (President, CEO, Vice President, etc.), and submitted with the bid.

Contractor _____

Address _____

I, _____, the undersigned, _____ of the above named
(Print Signer's Name) (Print Office Held)

Contractor does declare and affirm this _____ day of _____, _____, that I hold the aforementioned office
(Month) (Year)
in the above named Contractor and I affirm the following:

AFFIDAVIT I

The Contractor, his Agent, servants and/or employees, have not in any way colluded with anyone for and on behalf of the Contractor or themselves, to obtain information that would give the Contractor an unfair advantage over others, nor have they colluded with anyone for and on behalf of the Contractor, or themselves, to gain any favoritism in the award of the contract herein.

AFFIDAVIT II

No officer or employee of Howard County, whether elected or appointed, has in any manner whatsoever, any interest in or has received prior hereto or will receive subsequent hereto any benefit, monetary or material, or consideration from the profits or emoluments of this contract, job, work or service for the County, and that no officer or employee has accepted or received or will receive in the future a service or thing of value, directly or indirectly, upon more favorable terms than those granted to the public generally, nor has any such officer or employee of the County received or will receive, directly or indirectly, any part of any fee, commission or other compensation paid or payable to the County in connection with this contract, job, work, or service for the County, excepting, however, the receipt of dividends on corporation stock.

AFFIDAVIT III

Neither I, nor the Contractor, nor any officer, director, or partners, or any of its employees who are directly involved in obtaining contracts with Howard County have been convicted of bribery, attempted bribery, or conspiracy to bribe under the laws of any state, or of the federal government for acts of omissions committed after July 1, 1977.

AFFIDAVIT IV

Neither I, nor the Contractor, nor any of our agents, partners, or employees who are directly involved in obtaining contracts with Howard County have been convicted within the past 12 months of discrimination against any employee or applicant for employment, nor have we engaged in unlawful employment practices as set forth in Section 12.200 of the Howard County Code, or of Section 16 of Article 49B of the Annotated Code of Maryland or, of Sections 703 and 704 of Title VII of the Civil Rights Act of 1964.

AFFIDAVIT V

The Contractor:

i. Is not currently identified on the list created by the Maryland State Board of Public Works as a person engaging in investment activities in Iran as described in Section 17-702 of the *Maryland State Finance and Procurement Article* ; or

ii. Is not currently engaging in investment activities in Iran as described in Section 17-702 of the *Maryland State Finance and Procurement Article*.

If the person is unable to make the certification, it will provide the County, a detailed description of the Contractor's investment activities in Iran.

I do solemnly declare and affirm under the penalties of perjury that the contents of the foregoing affidavits are true and correct to the best of my knowledge, information and belief.

_____
Signature

_____
Printed Name

_____
Title

Rev. 09/25/2013

SECTION H Information on Howard County, Maryland's Living Wage Requirement

Basics of the Howard County Living Wage Legislation

In 2007, the Howard County Council passed legislation requiring a minimum "living wage" for employees of certain contractors and subcontractors of Howard County. A Contractor that is defined as a "Covered Employer" under Howard County Code Section 4.122A shall pay each employee an hourly rate sufficient to at least equal 125% of the federal poverty guidelines for a family of four individuals calculated on the basis of a 40-hour work week for 52 weeks.

Howard County Code Sec. 4.122A applies to service contracts estimated to be over $100,000.00 per year. The code does not apply to commodities contracts, contractors who employ fewer than 5 employees during the contract term, public entities, non-profit organizations, or contracts awarded under sole source, emergency, or expedited procedures. Other contractors may also be exempt; see the complete list of exemptions in Section 1on the front of this form.

The living wage requirements do not apply to an employee:

- who performs no measurable work related to any contract with the County
- who participates in a government-operated or government-sponsored program that restricts the earnings of or wages paid to employees to a level below the wage required under the law
- who participates for not longer than 120 days in a calendar year in a government-operated or government-sponsored summer youth employment program
- for whom a different wage rate is expressly set in a collective bargaining agreement, or
- for whom a higher wage is required by a federal, state, or County law.

This form serves as written certification to the County of your firm's intent to comply with the County's wage requirements during this term and any subsequent renewals. A Covered Employer shall not subdivide a contract; pay an employee through a third party; or treat an employee as a subcontractor or independent Contractor to avoid the imposition of any requirement under this law. Failure to comply with this requirement at any time during the initial term and subsequent renewals may be sufficient cause for termination for default. A violation of this law is a Class A civil offense; in addition to a fine, the County may suspend or debar the violator under Howard County Code Sec. 4.117.

How the Living Wage Rate is Calculated

The Howard County Living Wage Rate is calculated by taking 125% of the Poverty Guideline for a family of 4, then using this amount to determine the hourly rate based on 40 hours/week. For example, on January 22, 2014, the Federal HHS Poverty Guideline was published as $23,850 for a family of 4 (www.aspe.hhs.gov/poverty).

125% of $23,850 = $29,812.50 $29,812.50 ÷ 52 weeks ÷ 40 hrs/week = **$14.33 per hour**

This hourly rate must be paid to employees (full-time or part-time) during the time the employees actually provide services to the County. The current Living Wage remains in effect until new Federal HHS Poverty Guidelines are published next January. If there is a change, the Office of Purchasing will attempt to notify all current contractors via email using the email address provided on this form. The current rate is posted on our website at www.howardcountymd.gov/purchasing. It is the contractor's responsibility to ascertain the current rate.

Since the rate is subject to change annually, you must ensure that your bid pricing is sufficient to cover the cost of any increases during the term of the contract, including subsequent renewals. All prices shall take the current wage rate, and subsequent increases in the wage rate, if any, into account and there shall be no unit price adjustment for future wage rate increases during the initial term of this agreement and any subsequent renewals thereof. Future wage rate increases are hereby defined as any new rates approved by the County that take effect after and supersede the rate shown in this solicitation.

If you have questions about the Living Wage Requirement or how to complete this form, please contact the Office of Purchasing at purchasing@howardcountymd.gov or 410-313-6370.

Howard County, Maryland Wage Rate Requirements for Service Contracts Exemption Status Subtitle 1, Howard County Code Section 4.122A(b)(2)

Prime Contr.	Sub-Contr.	Section 1: Exemptions	Check all that apply, then continue to Section 2. If none of these statements apply to your company or the Subcontractor, check the last box in this section and continue to Section 2.
□	□		Contractor or Subcontractor employs fewer than 5 employees at any time during the contract term.
□	□		Contractor or Subcontractor received less than $100,000 from the County in the most recent 12-month period prior to the start date, and will be entitled to receive less than $100,000 from the County within the next 12-month period.
□	□		Contractor or Subcontractor is a nonprofit organization that has qualified for an exemption from federal income taxes under Section 501(c)(3) of the Internal Revenue Code.
□	□		Contractor or Subcontractor is expressly precluded from complying with Howard County Code Sec. 4.122A by the terms of any federal, state, or County law, federal or state contract or grant, and the contract falls within that preclusion.
□	□		Contractor or Subcontractor is a public entity.
□	□		Contractor or Subcontractor participates in a contract awarded under Howard County Code Secs. 4.110 (Sole Source), 4.111 (Emergency), or 4.112 (Expedited).
□	□		Contractor or Subcontractor is a regulated public utility.
□	□		Contract was awarded under a cooperative procurement with another government or organization of governments.

Check here □ if none of the above statements are applicable to your company or to the Subcontractor, then continue to Section 2.

Section 2: Certifications

- If you checked any exemptions in Section 1, skip this section and continue to Section 3.
- If you did not check any exemptions in Section 1, check each box in Section 2 that applies to your company, then complete Section 3 below.

I do hereby certify that I have read and understand the provisions of Section 4.122A of the Howard County Code, that I am an authorized representative of the Contractor named below, and that:

□ As a "covered employer," the Contractor and all Subcontractors will comply with the County's Wage Rate Requirements for Service Contracts (Howard County Code Sec. 4.122A) and will pay all employees not exempt under the wage requirements, and who perform direct measurable work for the County, the applicable wage requirements at the time the work is performed. The Contractor will keep the records necessary to show compliance and will submit such records to the Purchasing Agent on request of the Purchasing Agent; and will publicize the requirements of this law to any employees who may be covered by the law. The Contractor's proposed pricing is sufficient to meet the current living wage rate requirements during the initial term of the agreement and any increases applicable to subsequent renewals.

□ **If health insurance is provided to employees**, the per employee hourly cost of the premium for health insurance to an employee who provides services to the County that appears in the bid or proposal is correct.

Section 3: Contact Information

Provide your contact information in the space below, then sign and date this form and submit it with your bid.

Contractor Name _____ Vendor Federal ID Number _____

Address _____ Phone Number _____

_____ Email Address _____

Authorized Signature _____ Date _____

Print Name of Signatory _____ Title of Signatory _____

Office of Purchasing Use Only	Contract Title: Electric Bus Project		**Buyer's Initials: DPH**
	Contract No:	Renewal No.	
	Capital Project No:	Contract Term:	

EXHIBIT I
HOWARD COUNTY, MARYLAND
AGREEMENT

THIS AGREEMENT made by and between Howard County, Maryland [as Purchasing Agent For Howard County Health Department, remove if not applicable], a body corporate and politic, (hereinafter "County") and [NAME AND ADDRESS OF CONTRACTOR], Federal Employer Identification Number (FEIN) XX-XXXXXXX, Telephone Number XXX-XXX-XXXX (hereinafter the "Contractor").

WHEREAS, the said Contractor, in consideration of the payments hereinafter specified and agreed to be made by said County, hereby covenants and agrees to Select One, in strict and entire conformity with the Attachment A entitled, Select One, and any Purchase Order subsequently issued and the Request for Proposals No. RFP#-Year RFP TITLE and the response and any amendments or revisions thereto (collectively, the "Bid") attached hereto and incorporated herein.

NOW THEREFORE, in consideration of the mutual promises and covenants, the parties hereto agree that the County shall pay the Contractor, an amount as set forth herein, for Select One in accordance with this Agreement, the other attachments hereto, the Bid and the Purchase Order all of which are hereby incorporated into and made a part of this Agreement. Notwithstanding any other terms or provisions of this Agreement, in the event the County is temporarily or permanently prevented, restricted or delayed in the performance of any or all of the duties and obligations imposed upon or assumed by it hereunder, by act of the General Assembly of Maryland or the Howard County Council, by a court of competent jurisdiction or by administrative delay not due to the fault of the County (and its members and agents), the County shall not be liable directly or indirectly for any claims caused to or suffered by the Contractor or any other person in connection with or as a result of such prevention, restriction or delay. In addition the parties hereto agree as follows:

1. Contractor's Duties The Contractor shall be an independent Contractor and not an employee of the County and the Contactor's employees who are assigned to provide services to the County under this Agreement shall be employees of the Contractor and not the County. The Contractor shall be responsible for the reporting and remittance of all state and federal taxes, compensable workers' compensation claims and coverage of unemployment claims filed by its employees. The Contractor shall [perform the services] [provide the goods] outlined in Attachment A hereto. The Contractor's [services] [goods] will be provided with due care and in accordance with all applicable standards. The Contractor shall [perform the services][provide the goods] for the _____of the County, or Designee, who shall have authority to administer the Agreement.

2. Compensation

2.1. In consideration of the Select One to be provided by the Contractor, the County shall pay the Contractor as follows:

in accordance with the unit prices set forth in the Proposal.

in accordance with the Select One attached hereto as Attachment A.

the sum of Dollar amount typed Dollars ($Dollar amount Numerical)

an hourly rate of $0.00 per hour for an approximate total of number of hours typed hours and shall reimburse the Contractor for eligible expenses incurred by the Contractor in the performance of the Contractor's responsibilities and obligation under this Agreement. The eligible expenses are set forth in Attachment A.
an amount equal to 90% of the amount invoiced pursuant to Paragraph 2.2 below. Ten percent (10%) of each disbursement shall be retained by the County and disbursed in a lump sum upon Select One in a manner satisfactory to the County, in its sole discretion.

2.2. The Contractor shall submit invoices to the County: Select One. The Contractor's invoices shall reflect the:

- Contractor's name
- Address
- Federal tax identification number
- Contract number (the first two digits are 44XXXXXXXX)
- Purchase Order number (the first digit is 2XXXXXXXXX)
- Contract line number
- Unit price and extended price (the unit price must match a line on the contract)
- Description of goods provided and/or services performed.

2.2.1 The proper form of County invoices requires that the necessary information be included on all invoices.

2.2.2 All invoices shall be submitted in triplicate to DEPARTMENT NAME AND ADDRESS. Invoices in the proper form and approved by the County shall be paid by the County within 30 days of receipt thereof.

2.2.3 Invoices failing to contain the information enumerated above may be returned for correction. The County reserves the right to approve such invoices, in its sole discretion, and to request such detail and additional information as the County, in its discretion deems appropriate.

2.3. This Agreement shall be effective according to the following:
MONTH DATE, YEAR OR

when executed by Howard County

and shall continue through January 1, 2001, at which time the County may exercise its option to renew set forth in Paragraph 3.2 below, unless sooner terminated pursuant to Paragraphs 5 and 7 hereof.

2.4. The County reserves the right to renew this Agreement for INSERT RENEWAL PERIOD on the same terms and conditions set forth herein. Insert and changed to the terms i.e. Compensation. Unless set forth in a written amendment, the compensation, reimbursement and manner of payment set forth in Paragraph 2 shall remain as is. In the event any renewal changes the terms and conditions set forth herein, the approval of the Howard County Council may be required.

3. Contractor's Representations and Warranties The Contractor hereby represents the following:

3.1. The Contractor is a Select One, duly formed and validly existing under the laws of the State of INSERT STATE OF INCORPORATION and is qualified to do business and is in good standing in the State of Maryland.

3.2. The Contractor has the power and authority to consummate the obligations and responsibilities contemplated hereby, and has taken all necessary action to authorize the execution, delivery and performance required under this Agreement.

3.3. The person executing this Agreement for the Contractor warrants that s/he is duly authorized by the Contractor to execute this Agreement on the Contractor's behalf.

3.4. Select One: The services to be provided under this Agreement shall be performed competently and with due care, and in accordance with all applicable laws, codes, ordinances and regulations and licensing requirements. OR The goods to be delivered shall comply with the implied warranties of merchantability and fitness for use, and all express warranties created by this Agreement.

3.5. The Contractor has obtained and shall continue to maintain, at its own cost, such licenses and certifications as are necessary to provide the services rendered under this Agreement, and shall present such licenses to the County upon its request for the same.

3.6. All representations and warranties made in the Affidavit and the Bid response remain true and correct in all respects.

4. Termination

4.1. Termination for Convenience: The County may terminate this Agreement, in whole or in part, whenever the County determines that such termination is in the best interest of the County, without showing cause, upon giving at least 30 days written notice to the Contractor. The County shall pay all reasonable costs incurred by the Contractor up to the date of termination. However, in no event shall the Contractor be paid an amount which exceeds the price bid for the work performed. The Contractor shall not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

4.2. Termination for Default: When the Contractor has not performed or has unsatisfactorily performed one or more material terms of the Agreement, the County may terminate the Agreement for default. Upon termination for default, payment may be withheld at the discretion of the County. Failure on the part of a Contractor to fulfill the contractual obligations shall be considered just cause for termination of the Agreement. If the damages exceed the undisbursed sums available for compensation, the County shall not be obligated to make any further disbursements hereunder. The Contractor will be paid for work satisfactorily performed prior to termination less any excess costs incurred by the County in reprocuring and completing the work.

5. Remedies for Default

5.1. The County shall have the right upon the happening of any Default, without providing notice to the Contractor:

a. In addition to other available rights and remedies, to terminate this Agreement immediately, in whole or in part;

b. To suspend the Contractor's authority to receive any undisbursed funds; and/or

c. To proceed at any time or from time to time to protect and enforce all rights and remedies available to the County, by suit or any other appropriate proceedings, whether for specific performance of any covenant, term or condition set forth in this Agreement, or for damages or other relief, or proceed to take any action authorized or permitted under applicable law or regulations.

6.2 Upon termination of this Agreement for default, the County may elect to pay the Contractor for Select One up to the date of termination, less the amount of damages caused by the default. If the damages exceed the undisbursed sums available for compensation, the County shall not be obligated to make any further disbursements hereunder.

7. Remedies Cumulative and Concurrent No remedy herein conferred upon or reserved to the County is intended to be exclusive of any other remedies provided for in this Agreement, and each and every such remedy shall be cumulative, and shall be in addition to every other remedy given hereunder, or under this Agreement, or now or hereafter existing at law or in equity or by statute. Every right, power and remedy given to the County shall be concurrent and may be pursued separately, successively or together against the Contractor, and every right, power and remedy given to the County may be exercised from time to time as often as may be deemed expedient by the County.

8. Insurance The Contractor shall be required to provide insurance required by the County pursuant to the insurance requirements specified in this Request for Proposals including naming "Howard County, Maryland, its officials, employees, agents and volunteers" as Certificate Holder and as Additional Insured. The Contractor shall maintain the insurance coverages required by the County while this Agreement is in force, and provide documentation of such insurance in a form satisfactory to the County. Such documentation may, in the discretion of the County, be in the form of binders or declarations from the insurance company.

9. Confidential Information The Contractor shall not disclose any documentation and information disclosed to the Contractor in the course of its performance of duties hereunder with respect to the past, present and future County business, services and clients without the express written consent of the County.

10. Ethics

10.1 The Contractor certifies that the officer of the corporation who is executing this Agreement has read and understands Attachment B, entitled Howard County Charter and Code References to Ethics, which contains the provisions of Section 901(a) of the Howard County Charter dealing with conflicts of interest and Section 22.204 of the Howard County Code dealing with conflicts of interest.

10.2. The Contractor certifies that he/she has (1) not been a party to an agreement to bid a fixed or uniform price; (2) not offered nor will offer any gratuity to any county official or employee; and (3) not violated any of the fair employment provisions of Code Sec. 4.119 Ethics and Fair Employment Practices detailed in Attachment B.

11. Assignment Neither the County nor the Contractor shall assign, sublet or transfer its interest or obligations under this Agreement to any third party, without the written consent of the other. Nothing herein shall be construed to create any personal or individual liability upon any employee, officer or elected official of the County, nor shall this Agreement be construed to create any rights hereunder in any person or entity other than the parties of this Agreement.

12. Delegation of Duties The Contractor shall not delegate the Contractor's duties under this Agreement without the prior written consent of the County.

13. Indemnification.

13.1 The Contractor shall indemnify and hold harmless the County, its employees, agents and officials from any and all claims, suits, or demands including reasonable attorney fees which may be made against the County, its employees, agents or officials resulting from any act or omission committed in the performance of the duties imposed by and performed under the terms of this Agreement by the Contractor or anyone under agreement with the Contractor to perform duties under this Agreement. The Contractor shall not be responsible for acts of negligence or willful misconduct committed by the County, its employees, agents and officials.

13.2 Any property or work to be provided by the Contractor under this Agreement will remain at the Contractor's risk until written acceptance by the County; and the Contractor will replace, at the Contractor's expense, all property or work damaged or destroyed by any cause whatsoever.

13.3 In the event that there is a conflict between the indemnification provision set forth in the Purchase Order Terms and Conditions and/or the General Conditions and/or this Agreement, the terms set forth in the Agreement shall govern.

14. Integration and Modification This Agreement sets forth the entire agreement between the parties relative to the subject matter hereof. No representation, promise or condition, whether oral or written, not incorporated herein shall be binding upon either party to this Agreement. No waiver, modification or amendment of the terms of this Agreement shall be effective unless made in writing and signed by an authorized representative(s) of the party sought to be bound thereby.

15. Governing Law This Agreement shall be governed by and construed in accordance with the laws of the State of Maryland without regard to any choice of law principles that would dictate the laws of any other jurisdiction. The parties agree that the exclusive venue for any and all actions related hereto shall be the appropriate Federal or State court located within the State of Maryland.

16. Conflicting Terms

16.1 The Contractor acknowledges that any Purchase Order issued on or after the effective date of this Agreement is hereby integrated and made a part of this Agreement, provided, however that if a conflict arises between the provisions of this Agreement and the Purchase Order, the provisions of this Agreement shall prevail.

16.2 In the event of a conflict between the Bid and this Agreement, the provisions of this Agreement (without the conflicting terms in the Bid) shall prevail.

17. Severability If any of the provisions in this Agreement are declared by a court or other lawful authority to be unenforceable or invalid for any reason the remaining provisions hereof shall not be affected thereby and shall remain enforceable to the full extent permitted by law.

18. Time is of the Essence Time is of the essence with respect to performance of the terms and conditions of this Agreement.

19. Funding The contractual obligation of the County under this Agreement is contingent upon the availability of appropriated funds from which payment for this Agreement can be made.

20. Ownership of Goods All finished or unfinished work, reports, or goods that are the subject of this Agreement including any licenses or consents acquired by the Contractor for performance hereunder, shall be and shall remain the property of the County.

21. Notice Any notice required to be delivered shall be deemed to have been received when the notice has been sent by certified mail, return receipt, overnight carrier, or hand delivered to the following address and individual or at such other address and/or such other individual a party may identify in writing to the other party:

FOR THE COUNTY: Contact Name, address and telephone number

FOR THE CONTRACTOR: Contact Name, address and telephone number

22. No Waiver, Etc No failure or delay by the County to insist upon the strict performance of any term, condition or covenant of this Agreement, or to exercise any right, power, or remedy consequent upon a breach thereof, shall constitute a waiver of any such term, condition, or covenant or of any such breach, or preclude the County from exercising any such right, power, or remedy at any later time or times.

23. Wage Rate Requirements The Contractor certifies that the officer of the corporation who is executing this Agreement has read and understands this Request for Proposals, Howard County Code, Sec 4.122A Wage Requirements.

INSERT ANY SPECIAL CLAUSES HERE, SUCH AS WARRANTIES, LIQUIDATED DAMAGES ETC.

WITNESS: **[INSERT LEGAL NAME OF CONTRACTOR]**

_____ By: _____
Signature [Insert Name]
[Insert Title]

Print Name :_____

WITNESS: **HOWARD COUNTY, MARYLAND**, a body corporate and politic

_____ By: _____
Lonnie R. Robbins Ken Ulman
Chief Administrative Officer County Executive
Purchasing Agent For Howard County Health Department,
(remove if not applicable)

APPROVED FOR LEGAL SUFFICIENCY
this_____day of_____, 2014:

_____
Margaret Ann Nolan
County Solicitor

REVIEWING ATTORNEY:

_____
Type Name: _____
Title: _____

INFORMATION TECHNOLOGY APPROVED:

_____
Christopher Merdon (IF APPLICABLE)
Chief Information Officer
Technology & Communication Services

APPROVED FOR SUFFICIENCY OF FUNDS:

_____
Stanley J. Milesky
Director of Finance

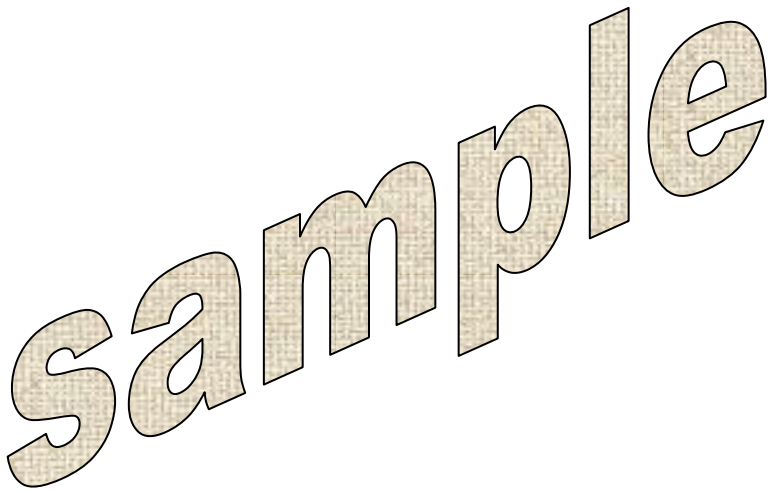
DEPARTMENT APPROVED:

_____
[Insert Dept. Head Name]
[Insert Title]

ATTACHMENT A

SERVICES TO BE PERFORMED

The above are in addition to any other services set forth in the Bid.



ATTACHMENT B

HOWARD COUNTY CHARTER AND CODE REFERENCES TO ETHICS

Charter Section 901. Conflict of Interest.

(a) **Prohibitions**. No officer or employee of the County, whether elected or appointed, shall in any manner whatsoever be interested in or receive any benefit from the profits or emoluments of any contract, job, work, or service for the County. No such officer or employee shall accept any service or thing of value, directly or indirectly, from any person, firm or corporation having dealings with the County, upon more favorable terms than those granted to the public generally, nor shall he receive, directly or indirectly, any part of any fee, commission or other compensation paid or payable by the County, or by any person in connection with any dealings with the County, or by any person in connection with any dealings with or proceedings before any branch, office, department, board, commission or other County of the County. No such officer or employee shall directly or indirectly be the broker or agent who procures or receives any compensation in connection with the procurement of any type of bonds for County officers, employees or persons or firms doing business with the County. No such officer or employee shall solicit or accept any compensation or gratuity in the form of money or otherwise for any act or omission in the course of his public work; provided, however, that the head of any department or board of the County may permit an employee to receive a reward publicly offered and paid for, for the accomplishment of a particular task.

(b) **Rules of construction; exceptions by Council**. The provisions of this Section shall be broadly construed and strictly enforced for the purpose of preventing officers and employees from securing any pecuniary advantages, however indirect, from their public associations, other than their compensation provided by law.

In order, however, to guard against injustice, the Council may, by resolution, specifically authorize any County officer or employee to own stock in any corporation or to maintain a business in connection with any person, firm or corporation dealing with the County, if, on full public disclosure of all pertinent facts to the County Council by such officer or employee, the Council shall determine that such stock ownership or connection does not violate the public interest.

The County Council may, by ordinance, delegate to the Howard County Ethics Commission the power to make such determinations and to authorize the ownership or connection. Any ordinance which delegates this power shall provide for procedures including a public hearing, and shall establish criteria for determining when the ownership or connection does not violate the public interest.

(c) **Penalties**. Any officer or employee of the County who willfully violates any of the provisions of this Section shall forfeit his office. If any person shall offer, pay, refund or rebate any part of any fee, commission, or other form of compensation to any officer or employee of the County in connection with any County business or proceeding, he shall, on conviction, be punishable by imprisonment for not less than one or more than six months or a fine of not less than $100.00 or more than $1,000.00, or both. Any contract made in violation of this Section may be declared void by the Executive or by resolution of the Council. The penalties in this Section shall be in addition to all other penalties provided by law.

Code Section 4.119. Ethics and Fair Employment Practices.

(a) Conflict of Interest**. Bidders, vendors, purchasers and county employees involved in the purchasing process shall be governed by the provisions of the Howard County Charter and Howard County law regarding conflict of interest. No vendor shall offer a gratuity to an official or employee of the county. No official or employee shall accept or solicit a gratuity.**

(b) **Discouragement of Uniform Bidding**.

(1) It is the policy of the county to discourage uniform bidding by every possible means and to endeavor to obtain full and open competition on all purchases and sales.

(2) No bidder may be a party with other bidders to an agreement to bid a fixed or uniform price.

(3) No person may disclose to another bidder, nor may a bidder acquire, prior to the opening of bids, the terms and conditions of a bid submitted by a competitor.

(c) **Fair Employment Practices**

(1) Bidders, vendors and purchases may not engage in unlawful employment practices as set forth in Subtitle 2 "human Rights" of Title 12 of the Howard County Code Section 14 of Article 49B of the Annotated Code of Maryland or Sections 703 and 704 of Title VII of the Civil Rights Act of 1964 as amended. Should any bidders, vendors or purchasers engage in such unlawful employment practices, they shall be subject to being declared irresponsible or being debarred pursuant to the provisions of this subtitle.

(2) The Howard County Office of Human Rights shall notify the county purchasing agent when any bidder is found, by a court of competent jurisdiction, to have engaged in any high unlawful employment practices.

(3) If any bidder has been declared to be an irresponsible bidder for having engaged in an unlawful employment practice and has been debarred from bidding pursuant to this subtitle, the Howard County Office of Human Rights shall review the employment practices of such bidder after the period of debarment has expired to determine if violations have been corrected and shall, within 30 days, file a report with the county purchasing agent informing the agent of such corrections before such bidder can be declared to be a responsible bidder by the County Purchasing agent.

(4) Payment of subcontractors. All contractors shall certify in writing that timely payments have been made to all subcontractors supplying labor and materials in accordance with the contractual arrangements made between the contractor and the subcontractors. No contractor will be paid a second or subsequent progress payment or final payment until such written certification is presented to the county purchasing agent.

Code Section 22.204. - Prohibited Conduct and Interests.

(a) **Participation Prohibitions.**

(1) Except as permitted by Commission regulation or opinion, an official or employee may not participate in:

(i) Except in the exercise of an administrative or ministerial duty that does not affect the disposition or decision of the matter, any matter in which, to the knowledge of the official or employee, the official or employee or a qualified relative of the official or employee has an interest.

(ii) Except in the exercise of an administrative or ministerial duty that does not affect the disposition or decision with respect to the matter, any matter in which any of the following is a party:

a. A business entity in which the official or employee has a direct financial interest of which the official or employee may reasonably be expected to know;

b. A business entity for which the official, employee, or a qualified relative of the official or employee is an officer, director, trustee, partner, or employee;

c. A business entity with which the official or employee or, to the knowledge of the official or employee, a qualified relative is negotiating or has any arrangement concerning prospective employment;

d. If the contract reasonably could be expected to result in a conflict between the private interests of the official or employee and the official duties of the official or employee, a business entity that is a party to an existing contract with the official or employee, or which, to the knowledge of the official or employee, is a party to a contract with a qualified relative;

e. An entity, doing business with the County, in which a direct financial interest is owned by another entity in which the official or employee has a direct financial interest, if the official or employee may be reasonably expected to know of both direct financial interests; or

f. A business entity that:

1. The official or employee knows is a creditor or obligee of the official or employee or a qualified relative of the official or employee with respect to a thing of economic value; and

2. As a creditor or obligee, is in a position to directly and substantially affect the interest of the official or employee or a qualified relative of the official or employee.

(2) A person who is disqualified from participating under paragraph 1. of this subsection shall disclose the nature and circumstances of the conflict and may participate or act if:

(i) The disqualification leaves a body with less than a quorum capable of acting;

(ii) The disqualified official or employee is required by law to act; or

(iii) The disqualified official or employee is the only person authorized to act.

(3) The prohibitions of paragraph 1 of this subsection do not apply if participation is allowed by regulation or opinion of the Commission.

(b) **Employment and Financial Interest Restrictions.**

(1) Except as permitted by regulation of the commission when the interest is disclosed or when the employment does not create a conflict of interest or appearance of conflict, an official or employee may not:

(i) Be employed by or have a financial interest in any entity:

a. Subject to the authority of the official or employee or the County County, board, commission with which the official or employee is affiliated; or

b. That is negotiating or has entered a contract with the County, board, or commission with which the official or employee is affiliated; or

(ii) Hold any other employment relationship that would impair the impartiality or independence of judgment of the official or employee.

(2) The prohibitions of paragraph (1) of this subsection do not apply to:

(i) An official or employee who is appointed to a regulatory or licensing authority pursuant to a statutory requirement that persons subject to the jurisdiction of the authority be represented in appointments to the authority;

(ii) Subject to other provisions of law, a member of a board or commission in regard to a financial interest or employment held at the time of appointment, provided the financial interest or employment is publicly disclosed to the appointing authority and the Commission;

(iii) An official or employee whose duties are ministerial, if the private employment or financial interest does not create a conflict of interest or the appearance of a conflict of interest, as permitted and in accordance with regulations adopted by the Commission; or

(iv) Employment or financial interests allowed by regulation of the Commission if the employment does not create a conflict of interest or the appearance of a conflict of interest or the financial interest is disclosed.

(c) **Post-Employment Limitations and Restrictions.**

(1) A former official or employee may not assist or represent any party other than the County for compensation in a case, contract, or other specific matter involving the County if that matter is one in which the former official or employee significantly participated as an official or employee.

(2) For a year after the former member leaves office, a former member of the County Council may not assist or represent another party for compensation in a matter that is the subject of legislative action.

(d) **Contingent Compensation.** Except in a judicial or quasi-judicial proceeding, an official or employee may not assist or represent a party for contingent compensation in any matter before or involving the County.

(e) **Use of Prestige of Office.**

(1) An official or employee may not intentionally use the prestige of office or public position for the private gain of that official or employee or the private gain of another.

(2) This subsection does not prohibit the performance of usual and customary constituent services by an elected official without additional compensation.

(f) **Solicitation and Acceptance of Gifts.**

(1) An official or employee may not solicit any gift.

(2) An official or employee may not directly solicit or facilitate the solicitation of a gift, on behalf of another person, from an individual regulated lobbyist.

(3) An official or employee may not knowingly accept a gift, directly or indirectly, from a person that the official or employee knows or has the reason to know:

(i) Is doing business with or seeking to do business with the County office, County, board or commission with which the official or employee is affiliated;

(ii) Has financial interests that may be substantially and materially affected, in a manner distinguishable from the public generally, by the performance or nonperformance of the official duties of the official or employee;

(iii) Is engaged in an activity regulated or controlled by the official's or employee's governmental unit; or

(iv) Is a lobbyist with respect to matters within the jurisdiction of the official or employee.

(4) (i) Subsection (4)(ii) does not apply to a gift:

a. That would tend to impair the impartiality and the independence of judgment of the official or employee receiving the gift;

b. Of significant value that would give the appearance of impairing the impartiality and independence of judgment of the official or employee; or

c. Of significant value that the recipient official or employee believes or has reason to believe is designed to impair the impartiality and independence of judgment of the official or employee.

(ii) Notwithstanding paragraph (3) of this subsection, an official or employee may accept the following:

a. Meals and beverages consumed in the presence of the donor or sponsoring entity;

b. Ceremonial gifts or awards that have insignificant monetary value;

c. Unsolicited gifts of nominal value that do not exceed $20.00 in cost or trivial items of informational value;

d. Reasonable expenses for food, travel, lodging, and scheduled entertainment of the official or the employee at a meeting which is given in return for the participation of the official or employee in a panel or speaking engagement at the meeting;

e. Gifts of tickets or free admission extended to an elected official to attend a charitable, cultural, or political event, if the purpose of this gift or admission is a courtesy or ceremony extended to the elected official's office;

f. A specific gift or class of gifts that the Commission exempts from the operation of this subsection upon a finding, in writing, that acceptance of the gift or class of gifts would not be detrimental to the impartial conduct of the business of the County and that the gift is purely personal and private in nature;

g. Gifts from a person related to the official or employee by blood or marriage, or any other individual who is a member of the household of the official or employee; or

h. Honoraria for speaking to or participating in a meeting, provided that the offering of the honorarium is not related, in any way, to the official's or employee's official position.

(g) **Disclosure of Confidential Information.** Other than in the discharge of official duties, an official or employee may not disclose or use confidential information, that the official or employee acquired by reason of the official's or employee's public position and that is not available to the public, for the economic benefit of the official or employee or that of another person.

(h) **Participation in Procurement.**

(1) An individual or a person that employs an individual who assists a County, County or unit in the drafting of specifications, an invitation for bids, or a request for proposals for a procurement, may not submit a bid or proposal for that procurement, or assist or represent another person, directly or indirectly, who is submitting a bid or proposal for the procurement.

(2) The Commission may establish exemptions from the requirements of this section for providing descriptive literature, sole source procurements, and written comments solicited by the procuring County.

EXHIBIT II

SAMPLE INVOICE

SAMPLE INVOICE

Your Company's Name
Address
Email address
Telephone/Fax Nos.
Mail Invoice To:
Howard County Government
Department/Office Name
Address (From the Purchase Order)
Address

Invoice No.:
Date:

FEIN:

Contract #: 44XXXXXXXX
Purchase Order #: 2XXXXXXXXX

Performance Period: __/__13-__/__/14
(For Services)

Cont. Line #	PO Item #	Goods/Services Description	List Price	% Discount	Net Price	Quantity	Extended Price
Total							

Payment Terms:

Please make check payable to ***Your Company's Name*** and remit payment to:

Your Company's Name
Address
Address

If you have any questions regarding this invoice, please contact
Your Company's Contact Person's Name at ***Telephone No.*** and ***Email Address***.

EXHIBIT III

FEDERAL REQUIREMENTS

Contractors shall review all Federal requirements related to the purchase of revenue and nonrevenue vehicles and sign where applicable. This entire Exhibit III must be completed and returned with the technical portion of the proposal.

FLY AMERICA REQUIREMENTS
49 U.S.C. §40118
41 CFR Part 301-10

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation**.**

BUY AMERICA REQUIREMENTS
49 U.S.C. 5323(j)
49 CFR Part 661

The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (below) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

DO NOT sign for both the certificate of compliance and non-compliance, only the applicable certification.

Certification requirement for procurement of steel, iron, or manufactured products.

Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 CFR Part 661.5.

Date _____

Signature _____

Company Name _____

Title _____

OR

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

Title _____

Certification requirement for procurement of buses, other rolling stock and associated equipment.

Certificate of Compliance with 49 U.S.C. 5323(j)(2)(C).

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Date _____

Signature _____

Company Name _____

Title _____

OR

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11, but may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

Title _____

CARGO PREFERENCE REQUIREMENTS
46 U.S.C. 1241
46 CFR Part 381

Cargo Preference - Use of United States-Flag Vessels - The Contractor agrees:

a. to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels;

b. to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of leading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of -lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the contractor in the case of a subcontractor's bill-of-lading.)

c. to include these requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

ENERGY CONSERVATION REQUIREMENTS
42 U.S.C. 6321 et seq.
49 CFR Part 18

The contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

CLEAN WATER REQUIREMENTS
33 U.S.C. 1251

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et . The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

BUS TESTING
49 U.S.C. 5318(e)
49 CFR Part 665

The Contractor [Manufacturer] agrees to comply with 49 U.S.C. A 5323(c) and FTA's implementing regulation at 49 CFR Part 665 and shall perform the following:

1) A manufacturer of a new bus model or a bus produced with a major change in components or configuration shall provide a copy of the final test report to the recipient at a point in the procurement process specified by the recipient which will be prior to the recipient's final acceptance of the first vehicle.

2) A manufacturer who releases a report under paragraph 1 above shall provide notice to the operator of the testing facility that the report is available to the public.

3) If the manufacturer represents that the vehicle was previously tested, the vehicle being sold should have the identical configuration and major components as the vehicle in the test report, which must be provided to the recipient prior to recipient's final acceptance of the first vehicle. If the configuration or components are not identical, the manufacturer shall provide a description of the change and the manufacturer's basis for concluding that it is not a major change requiring additional testing.

4) If the manufacturer represents that the vehicle is "grandfathered" (has been used in mass transit service in the United States before October 1, 1988, and is currently being produced without a major change in configuration or components), the manufacturer shall provide the name and address of the recipient of such a vehicle and the details of that vehicle's configuration and major components.

CERTIFICATION OF COMPLIANCE WITH FTA'S BUS TESTING REQUIREMENTS
The undersigned [Contractor/Manufacturer] certifies that the vehicle offered in this procurement complies with 49 U.S.C. A 5323(c) and FTA's implementing regulation at 49 CFR Part 665.

The undersigned understands that misrepresenting the testing status of a vehicle acquired with Federal financial assistance may subject the undersigned to civil penalties as outlined in the Department of Transportation's regulation on Program Fraud Civil Remedies, 49 CFR Part 31. In addition, the undersigned understands that FTA may suspend or debar a manufacturer under the procedures in 49 CFR Part 29.

Date _____

Signature _____

Company Name _____

Title _____

PRE-AWARD AND POST DELIVERY AUDITS REQUIREMENTS
49 U.S.C. 5323
49 CFR Part 663

The Contractor agrees to comply with 49 U.S.C. § 5323(l) and FTA's implementing regulation at 49 C.F.R. Part 663 and to submit the following certifications:

(1) Buy America Requirements: The Contractor shall complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the Bidder/Offeror certifies compliance with Buy America, it shall submit documentation which lists 1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and 2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly.

(2) Solicitation Specification Requirements: The Contractor shall submit evidence that it will be capable of meeting the bid specifications.

(3) Federal Motor Vehicle Safety Standards (FMVSS): The Contractor shall submit 1) manufacturer's FMVSS self-certification sticker information that the vehicle complies with relevant FMVSS or 2) manufacturer's certified statement that the contracted buses will not be subject to FMVSS regulations.

BUY AMERICA CERTIFICATE OF COMPLIANCE WITH FTA REQUIREMENTS
FOR BUSES, OTHER ROLLING STOCK, OR ASSOCIATED EQUIPMENT

Certificate of Compliance
The bidder hereby certifies that it will comply with the requirements of 49 U.S.C. Section 5323(j)(2)(C), Section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended, and the regulations of 49 C.F.R. 661.11:

Date _____

Signature _____

Company Name _____

Title _____

OR

Certificate of Non-Compliance

The bidder hereby certifies that it cannot comply with the requirements of 49 U.S.C. Section 5323(j)(2)(C) and Section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended, but may qualify for an exception to the requirements consistent with 49 U.S.C. Sections 5323(j)(2)(B) or (j)(2)(D), Sections 165(b)(2) or (b)(4) of the Surface Transportation Assistance Act, as amended, and regulations in 49 C.F.R. 661.7.

Date _____

Signature _____

Company Name _____

Title _____

LOBBYING
31 U.S.C. 1352
49 CFR Part 19
49 CFR Part 20

Contractors who apply or bid for an award of $100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

Certification for Contracts, Grants, Loans, and Cooperative Agreements
(To be submitted with each bid or offer exceeding $100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq* .)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure

Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure or failure.]

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq., apply* to this certification and disclosure, if any.

_____ Signature of Contractor's Authorized Official

_____ Name and Title of Contractor's Authorized Official

_____ Date

ACCESS TO RECORDS AND REPORTS
49 U.S.C. 5325
18 CFR 18.36 (i)
49 CFR 633.17

The following access to records requirements apply to this Contract:

LOCAL GOVERNMENT
Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C. F. R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C. F. R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.

NON-PROFIT
Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49

C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.

NON COMPETITIVE BIDS
Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through **other than** competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

ALL OF THE ABOVE
The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

FEDERAL CHANGES
49 CFR Part 18

Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the between Purchaser and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

CLEAN AIR
42 U.S.C. 7401 et seq
40 CFR 15.61
49 CFR Part 18

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 . The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Contract Work Hours and Safety Standards
(1) Overtime requirements - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) Withholding for unpaid wages and liquidated damages – The County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be

Necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

NO GOVERNMENT OBLIGATION TO THIRD PARTIES

No Obligation by the Federal Government.
(1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS
31 U.S.C. 3801 et seq.
49 CFR Part 31 18 U.S.C. 1001
49 U.S.C. 5307

Program Fraud and False or Fraudulent Statements or Related Acts.

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § § 3801 et seq . and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT)
49 CFR Part 29
Executive Order 12549

Suspension and Debarment
This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.

By signing and submitting its bid or proposal, the bidder or proposer certifies as follows:

The certification in this clause is a material representation of fact relied upon by the County. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to the County, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

CIVIL RIGHTS REQUIREMENTS
29 U.S.C. § 623, 42 U.S.C. § 2000
42 U.S.C. § 6102, 42 U.S.C. § 12112
42 U.S.C. § 12132, 49 U.S.C. § 5332
29 CFR Part 1630, 41 CFR Parts 60 et seq.

Civil Rights - The following requirements apply to the underlying contract:

(1) Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

(2) Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:

(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq ., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal

Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(3) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

DISADVANTAGED BUSINESS ENTERPRISE (DBE)
49 CFR Part 26

Disadvantaged Business Enterprises
a. This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, *Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs.* The national goal for participation of Disadvantaged Business Enterprises (DBE) is 10%. The agency's overall goal for DBE participation is 10%.

b. The contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contract. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the County deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).

c. Vendors must submit with their Proposal a written implementation plan for meeting the DBE Goal. Attached MDOT DBE Forms "A" and "B" must also be completed. Proposals will not be accepted without these documents. Vendors are required to document sufficient DBE participation to meet these goals or, alternatively, document adequate good faith efforts to do so as provided for in 49 CFR 26.53 (see attached COMAR 21.11.03.11 Waiver Request). Award of this contract is conditioned on submission of the following, concurrent with and accompanying sealed bid, concurrent with and accompanying an initial proposal, prior to award:

1. The names and addresses of *DBE* firms that will participate in this contract;

2. A description of the work each *DBE* will perform;

3. The dollar amount of the participation of each *DBE* firm participating;

4. Written documentation of the Vendor/offers' commitment to use a *DBE* sub-Vendor whose participation it submits to meet the contract goal;

5. Written confirmation from the *DBE* that it is participating in the contract as provided the prime *Vendor*'s commitment; an

6. If the contract goal is not met, evidence of *Good Faith* efforts to do so must be provided in writing.

Vendors must present the information required above, as a matter of responsiveness, with initial proposals prior to contract award (see 49 CFR 26.53(3)).

(d) The *Vendor* is required to pay its sub-Vendors performing work related to this contract for satisfactory performance of that work no later than 30 days after the *Vendor*'s receipt of payment for that work from the County. In addition, the *Vendor* may not hold retainage from its sub-Vendors, is required to return any retainage payments to those sub-Vendors within 30 days after the sub-Vendor's work related to this contract is satisfactorily completed, is required to return any retainage payments to those sub-Vendors within 30 days after incremental acceptance of the sub-Vendor's work by the County and *Vendor*'s receipt of the partial retainage payment related to the sub-Vendor's work.

(e) The *Vendor* must promptly notify, whenever a DBE sub-Vendor performing work related to this contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE sub-Vendor to perform at least the same amount of work. The *Vendor* may not terminate any DBE sub-Vendor and perform that work through its own forces or those of an affiliate without prior written consent from the County.

MDOT DBE FORM A
FEDERALLY-FUNDED CONTRACTS (BIDS ONLY)
CERTIFIED DBE UTILIZATION AND FAIR SOLICITATION AFFIDAVIT
PAGE 1 OF 2

THIS AFFIDAVIT MUST BE INCLUDED WITH THE BID. IF THE BIDDER FAILS TO ACCURATELY COMPLETE AND SUBMIT THIS AFFIDAVIT AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE.

In connection with the bid submitted in response to Solicitation No. , I affirm the following:

1. DBE Participation (PLEASE CHECK ONLY ONE)

☐ I have met the overall certified Disadvantaged Business Enterprise (DBE) participation goal of percent (%). I agree that the DBE firms listed in the DBE Participation Schedule - Part 2 of the MDOT DBE Form B (Federally-Funded Contracts – Bids Only) will be used to accomplish the DBE participation goal for this Contract for at least the dollar amounts set forth therein.

OR

☐ I conclude that I am unable to achieve the DBE participation goal. I hereby request a waiver of the overall goal. Within 10 business days of receiving notice that our firm is the apparent awardee or as requested by the Procurement Officer, I will submit a written waiver request and all required documentation in accordance with COMAR 21.11.03.11. I agree that the DBE firms listed in the DBE Participation Schedule - Part 2 of the MDOT DBE Form B (Federally-Funded Contracts – Bids Only) will be used to accomplish the DBE participation goal for this Contract for at least the dollar amounts set forth therein.

2. Additional MBE Documentation

I understand that if I am notified that I am the apparent awardee or as requested by the Procurement Officer, I must submit the following documentation within 10 business days of receiving such notice:
(a) Outreach Efforts Compliance Statement (MDOT DBE Form C - Federally-Funded Contracts – Bids Only);
(b) Subcontractor Project Participation Statement (MDOT DBE Form D - Federally-Funded Contracts – Bids Only);
(c) DBE Waiver Request documentation per COMAR 21.11.03.11 (if waiver was requested); and
(d) Any other documentation required by the Procurement Officer to ascertain bidder's responsibility in connection with the certified DBE participation goal.

I acknowledge that if I fail to return each completed document (in 2 (a) through (d)) within the required time, the Procurement Officer may determine that I am not responsible and therefore not eligible for contract award.

MDOT DBE FORM A
FEDERALLY-FUNDED CONTRACTS (BIDS ONLY)
CERTIFIED DBE UTILIZATION AND FAIR SOLICITATION AFFIDAVIT
PAGE 2 OF 2

3. Information Provided to DBE firms

In the solicitation of subcontract quotations or offers, DBE firms were provided not less than the same information and amount of time to respond as were non-DBE firms.

I solemnly affirm under the penalties of perjury that the information in this affidavit is true to the best of my knowledge, information and belief.

Company Name	Signature of Representative
Address	Printed Name and Title
City, State and Zip Code	Date

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS (BIDS ONLY)
DBE PARTICIPATION SCHEDULE

PART 1 – INSTRUCTIONS FOR DBE PARTICIPATION SCHEDULE

PARTS 2 AND 3 MUST BE INCLUDED WITH THE BID. IF THE BIDDER FAILS TO ACCURATELY COMPLETE AND SUBMIT PART 2 WITH THE BID AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE.

*** STOP ***
FORM INSTRUCTIONS
PLEASE READ BEFORE COMPLETING THIS FORM

1. Please refer to the Maryland Department of Transportation (MDOT) DBE Directory at www.mdot.state.md.us to determine if a firm is certified for the appropriate North American Industry Classification System ("NAICS") Code **and** the product/services description (specific product that a firm is certified to provide or specific areas of work that a firm is certified to perform). For more general information about NAICS, please visit www.naics.com. Only those specific products and/or services for which a firm is certified in the MDOT Directory can be used for purposes of achieving the DBE participation goal.

2. In order to be counted for purposes of achieving the DBE participation goal, the firm must be certified for that specific NAICS ("DBE" for Federally-funded projects designation after NAICS Code). **WARNING:** If the firm's NAICS Code is in **graduated status**, such services/products **will not be counted** for purposes of achieving the DBE participation goal. Graduated status is clearly identified in the MDOT Directory (such graduated codes are designated with the letter "G" after the appropriate NAICS Code).

3. Examining the NAICS Code is the **first step** in determining whether a DBE firm is certified and eligible to receive DBE participation credit for the specific products/services to be supplied or performed under the contract. The **second step** is to determine whether a firm's Products/Services Description in the DBE Directory includes the products to be supplied and/or services to be performed that are used to achieve the DBE participation goal.

4. If you have any questions as to whether a firm is certified to perform the specific services or provide specific products, please call MDOT's Office of Minority Business Enterprise at 1-800-544-6056 or send an email to mbe@mdot.state.md.us.

5. The Contractor's subcontractors are considered second-tier subcontractors. Third-tier contracting used to meet a DBE goal is to be considered the exception and not the rule. The following two conditions must be met before MDOT, its Modal Administrations and the Maryland Transportation Authority may approve a third-tier contracting agreement: (a) the bidder must request in writing approval of each third-tier contract arrangement, and (b) the request must contain specifics as to why a third-tier contracting arrangement should be approved. These documents must be submitted with the bid in Part 2 of this DBE Participation Schedule.

6. For each DBE firm that is being used as supplier/wholesaler/regular dealer/broker/manufacturer, please follow these instructions for calculating the **dollar amount of the subcontract for purposes of achieving the DBE participation goal:**

   A. Is the firm certified as a broker of the products/supplies? If the answer is YES, please continue to Item C. If the answer is NO, please continue to Item B.

   B. Is the firm certified as a supplier, wholesaler, regular dealer, or manufacturer of such products/supplies? If the answer is YES, continue to Item D. If the answer is NO, continue to Item C only if the DBE firm is certified to perform trucking/hauling services under NAICS Codes 484110, 484121, 484122, 484210, 484220 and 484230. If the answer is NO and the firm is not certified under these NAICS Codes, then no DBE participation credit will be given for the supply of these products.

   C. For purposes of achieving the DBE participation goal, you may count only the amount of any reasonable fee that the DBE firm will receive for the provision of such products/supplies - not the total subcontract amount or the value (or a percentage thereof) of such products and/or supplies. In Column 4 of the DBE Participation Schedule, please state the amount of any reasonable fee that the DBE firm will receive for the provision of such products/services in Line 4.1.

   D. Is the firm certified as a manufacturer (refer to the firm's NAICS Code and specific description of products/services) of the products/supplies to be provided? If the answer is NO, please continue to Item E. If the answer is YES, for purposes of achieving the DBE participation goal, you may count the total amount of the subcontract. In Column 4 of the DBE Participation Schedule, please state the total amount of the subcontract in Line 4.1.

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS (BIDS ONLY)
DBE PARTICIPATION SCHEDULE

PART 1 – INSTRUCTIONS FOR DBE PARTICIPATION SCHEDULE
PAGE 2 OF 2

E. Is the firm certified as a supplier, wholesaler and/or regular dealer? If the answer is YES (i) if the DBE firm is furnishing and installing the materials and is certified to perform these services, please include in Line 4.1 the total value of the subcontract amount (including full value of supplies); or (ii) if the firm is only being used as a supplier, wholesaler and/or regular dealer or is not certified to install the supplies/materials, for purposes of achieving the DBE participation goal, you may only count sixty percent (60%) of the value of the subcontract for these supplies/products (60% Rule). In Line 4.2 of the DBE Participation Schedule, please state amount of the subcontract for these supplies/products only (not installation) and sixty percent (60%) of such value.

7. Please note that for USDOT-funded projects, a DBE prime may count towards its DBE participation goal, work performed by its own forces. Include information about the DBE prime in Part 2.

8. **WARNING:** The percentage of DBE participation, computed using the dollar amounts in Column 4 for all of the DBE firms listed in Part 2, MUST equal at least the DBE participation goal as set forth in MDOT DBE Form A – Federally-Funded Contracts (Bids Only) for this solicitation. If a bidder is unable to achieve the DBE participation goal, then the bidder must request a waiver in Form A or the bid shall be deemed not responsive. You may wish to use the Worksheet shown below to assist you in calculating the percentages and confirming that you have met the applicable DBE participation goal.

WORKSHEET

Total DBE Firm Participation Amount (Add amounts listed for all DBE Firms in Column 4 of DBE Participation Schedule)	$_____
Divide by Total Contract Amount	÷_____
Percent Overall DBE Participation	=_____

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS (BIDS ONLY)
DBE PARTICIPATION SCHEDULE

PART 2 – DBE PARTICIPATION SCHEDULE

PART 2 MUST BE INCLUDED WITH THE BID. IF THE BIDDER FAILS TO ACCURATELY COMPLETE AND SUBMIT PART 2 WITH THE BID AS REQUIRED, THE BID SHALL BE DEEMED NOT RESPONSIVE.

PAGE ___ OF ____

Prime Contractor	Project Description	Solicitation Number

LIST INFORMATION FOR EACH CERTIFIED MBE SUBCONTRACTOR USED TO ACHIEVE THE DBE PARTICIPATION GOAL

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4 Unless the bidder requested a waiver in MDOT DBE Form A – Federally Funded Contracts (Bids Only) for this solicitation, the cumulative DBE participation for all DBE firms listed herein must equal at least the DBE participation goal set forth in Form A.
NAME OF DBE PRIME OR SUBCONTRACTOR AND TIER	CERTIFICATION NO. AND CLASSIFICATION	NAICS CODE/S NAICS Code/s of the specific products to be supplied or services to be performed by the DBE firm	FOR PURPOSES OF ACHIEVING THE DBE PARTICIPATION GOAL. State the dollar amount of the products/services in Line 4.1 except for those services or products where the DBE firm is being used as a wholesaler, supplier or regular dealer. For those items of work where the DBE firm is being used as a supplier, wholesaler and/or regular dealer complete Line 4.2 using the 60% Rule.
☐ Please check if DBE firm is a third-tier contractor (if applicable). Please submit written documents in accordance with Section 5 of Part 1 - Instructions	Certification Number: _____ ☐ Women-Owned ☐ African American-Owned ☐ Other DBE Classification		4.1 TOTAL AMOUNT TO BE PAID TO THE SUBCONTRACTOR (EXCLUDING PRODUCTS/SERVICES FROM SUPPLIERS, WHOLESALERS, AND REGULAR DEALERS). $ 4.2 TOTAL AMOUNT TO BE PAID TO THE SUBCONTRACTOR FOR ITEMS OF WORK WHERE THE DBE FIRM IS BEING USED AS A SUPPLIER, WHOLESALER AND/OR REGULAR DEALER. (PLEASE REFER TO SECTION 6(E) IN PART 1 - INSTRUCTIONS). Total value of Supplies/Products $ X 60% (60% Rule) = $ (Amount for purposes of achieving the DBE Participation Goal).

☐Please check if Continuation Sheets are attached.

MDOT DBE FORM B
FEDERALLY-FUNDED CONTRACTS (BIDS ONLY)
DBE PARTICIPATION SCHEDULE
CONTINUATION SHEET

PAGE __ OF ___

Prime Contractor	Project Description	Solicitation Number

LIST INFORMATION FOR EACH CERTIFIED MBE SUBCONTRACTOR USED TO ACHIEVE THE DBE PARTICIPATION GOAL

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4 Unless the bidder requested a waiver in MDOT DBE Form A – Federally Funded Contracts (Bids Only) for this solicitation, the cumulative DBE participation for all DBE firms listed herein must equal at least the DBE participation goal set forth in Form A.
NAME OF DBE PRIME OR SUBCONTRACTOR AND TIER	CERTIFICATION NO. AND CLASSIFICATION	NAICS CODE/S NAICS Code/s of the specific products to be supplied or services to be performed by the DBE firm	FOR PURPOSES OF ACHIEVING THE DBE PARTICIPATION GOAL. State the dollar amount of the products/services in Line 4.1 except for those services or products where the DBE firm is being used as a wholesaler, supplier or regular dealer. For those items of work where the DBE firm is being used as a supplier, wholesaler and/or regular dealer complete Line 4.2 using the 60% Rule.
☐ Please check if DBE firm is a third-tier contractor (if applicable). Please submit written documents in accordance with Section 5 of Part 1 - Instructions	Certification Number: _____ ☐ Women-Owned ☐ African American-Owned ☐ Other DBE Classification		4.1 TOTAL AMOUNT TO BE PAID TO THE SUBCONTRACTOR (EXCLUDING PRODUCTS/SERVICES FROM SUPPLIERS, WHOLESALERS OR REGULAR DEALERS). $ 4.2 TOTAL AMOUNT TO BE PAID TO THE SUBCONTRACTOR FOR ITEMS OF WORK WHERE THE DBE FIRM IS BEING USED AS A SUPPLIER, WHOLESALER AND/OR REGULAR DEALER. (PLEASE REFER TO SECTION 6(E) IN PART 1 - INSTRUCTIONS). Total value of Supplies/Products $ X 60% (60% Rule) = $ (Amount for purposes of achieving the DBE Participation Goal).

☐Please check if Continuation Sheets are attached.

ADA ACCESS

Access Requirements for Persons with Disabilities. The Contractor agrees to comply with the requirements of 49 U.S.C. § 5301(d), which states the Federal policy that elderly persons and persons with disabilities have the same right as other persons to use mass transportation service and facilities, and that special efforts shall be made in planning and designing those services and facilities to implement that policy. The Recipient also agrees to comply with all applicable requirements of section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794, which prohibits discrimination on the basis of handicaps, with the Americans with Disabilities Act of 1990 (ADA), as amended, 42 U.S.C. §§ 12101 *et seq*., which requires that accessible facilities and services be made available to persons with disabilities, including any subsequent amendments to that Act, and with the Architectural Barriers Act of 1968, as amended, 42 U.S.C. §§ 4151 *et seq*., which requires that buildings and public accommodations be accessible to persons with disabilities, including any subsequent amendments to that Act.

EXHIBIT IV

BUS AND CHARGE STATION TECHNICAL SPECIFICATION FORM

ALL-ELECTRIC TRANSIT BUS DATA SHEET

Bus Manufacturer:

_____

Bus Model Number:

_____

Basic Body Construction Type:

_____

General Dimensions

Overall length	Over bumpers		feet		inches
	Over body		feet		inches
Overall width	Over body excluding mirrors and lights		feet		inches
	Over body including mirrors		feet		inches
	Over tires		feet		inches
Overall height (maximum)			feet		inches

Frontal Area _____ **feet^2**

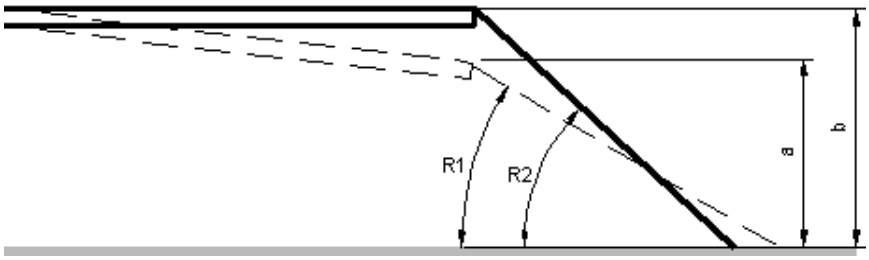
Angle of approach		degrees
Angle of departure		degrees
Breakover angle 1		degrees
Breakover angle 2		degrees

Doorway clear opening (at widest point) _____ inches

	Width with grab handles		**Width** without grab handles		**Height**	
Front door		inches		inches		inches
Center door (1)		inches		inches		inches
Center door (2)		inches		inches		inches
Rear door		inches		inches		inches

Front axle floor height above ground (centerline of bus)		inches
Center axle floor height above ground (centerline of bus)		inches

Rear axle floor height above ground (centerline of bus)		inches
Step height from ground (measured at center of doorway)		inches



	Front doorway		Center doorway		Ramp angle		Rear doorway	
Kneeled		inches (a)		inches (a)		degrees (R1)		inches (a)
Unkneeled		inches (b)		inches (b)		degrees (R2)		inches (b)

Interior head room (floor to ceiling at center of aisle)

First axle location		inches
Center of articulation		inches
Rear axle location		inches
Rear settee (in front of seat)		inches

Aisle width

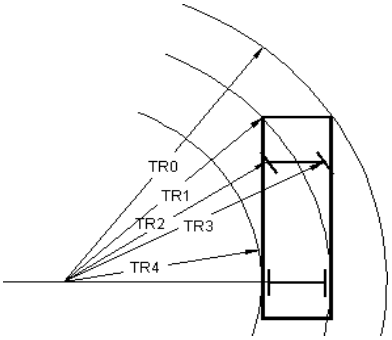
Minimum width on floor between first axle wheel housings		inches
Minimum width on floor between center axle (1) wheel housings		inches
Minimum width on floor between center axle (2) wheel housings		inches
Minimum width on floor between rear axle wheel housings		inches

Minimum ground clearance

Outside axles zones		inches
Inside axles zones		inches

Horizontal turning envelope (see diagram below)

Outside body turning radius, TR0 (including bumper)		feet		inches
Inside Body Turning Radius innermost point, TR4 (including bumper)		feet		inches



Wheel base

First axle to center/rear axle		inches
Center axle to rear axle		inches

Overhang, centerline of axle over bumper

Front		inches
Rear		inches

Floor

Maximum interior floor slope (from horizontal) ☐ degrees

Capacity

Total number of passenger sittings		
Passenger seating manufacturer/model number		
Total number of standing passengers (1 per 1.5 sq. ft.)		
Minimum hip to knee space		inches
Maximum hip to knee space		inches
Restraint system type and model number		

Bus weight (□ Verified on previously built model □ Estimated)

	Curb weight		**Curb weight plus seated load***		**GVWR**	
First axle		lbs		lbs		lbs
Center axle		lbs		lbs		lbs
Rear axle		lbs		lbs		lbs
Total		lbs		lbs		lbs

* Including operator and passengers at 150 lbs per person

Steering Axles

Manufacturer	
Type and weight rating	
Model number	

Drive axle (□ Center □ Rear)

Manufacturer	
Type and weight rating	
Model number	

Drive axle ratio

Differential ratio	
Differential efficiency	
Hub reduction ratio (if used)	
Final axle ratio (if hub reduction is used)	
Final axle efficiency (if hub reduction used)	

Transmission

Manufacturer	
Type	
Model number	
Number of forward speeds	
Gear Ratios	
Efficiency (at each GR)	
Traction motor horsepower rating	
Type ventilation/cooling	

Propshaft

Manufacturer	

Brake system

Make/type of fundamental system	
First axle brake chamber model	
Center axle brake chamber model	
Rear axle brake chamber model	
First axle slack adjuster	
Manufacturer	
Model number	

Center axle slack adjuster _____

Manufacturer	
Model number	
Rear axle slack adjuster	
Manufacturer	
Model number	
First axle brake drum/rotor	
Manufacturer	
Center axle brake drum/rotor	
Manufacturer	
Rear axle brake drum/rotor	
Manufacturer	

Air compressor

Manufacturer		
Type		
Model number		
Rated capacity		Cfm
Capacity at idle		cfm
Max Power Consumption		kW
Maximum warranted speed		rpm
Idle speed		rmp
Drive type		
Governor cut-in pressure		psi
Governor cut-out pressure		psi

Air Reservoir Capacity

Manufacturer				
Supply reservoir number and size		/		cubic inches total
Primary reservoir number and size		/		cubic inches total
Secondary reservoir number and size		/		cubic inches total
Parking reservoir number and size		/		cubic inches total
Accessory reservoir number and size		/		cubic inches total
Other reservoir number and size		/		cubic inches total

Bus Cooling System

Manufacturer	
Type	
Model number	
Description	
Max power consumption (kW)	

Total cooling system capacity (gallons)		gallons
Radiator fan manufacturer		
Fan speed/control type (mech/elect/hyb)		
Surge tank capacity		gallons
Surge tank material		
Overheat alarm temperature		degrees F
Shutdown temperature settings		degrees F

Electrical

Primary interior lighting system

Manufacturer	
Type	
Model number	

DC-DC Converter (12/24 V System)

Manufacturer	
Type	
Model number	
Output at idle	amps

DC-DC Converter (HVAC System)

Manufacturer	
Type	
Model number	
Output at idle	amps

Voltage equalizer

Manufacturer	
Model number	

Auxiliary inverter (120/240)

Manufacturer	
Model number	
Inverter technology	
Output voltage(s)	

Hotel Loads

List of Accessories	

Base auxiliary load (kW)	

Energy Storage

Batteries – low voltage

Manufacturer	
Type	
Model number	
Cold cranking amps	

Batteries/energy storage – high voltage

Manufacturer	
Type/Chemistry	
Model number	
Amp-hr rating and rate	
Useable Capacity (amp-hour)	
Mass (kg)	
Nominal operating voltage	
Cycle Life @ 80% DOD	
Specific energy (kWh/kg)	
Specific power	
Operating temperature range	

Attach energy storage data sheet from manufacturer, to include

- ***energy efficiency,***
- ***estimated calendar life,***
- ***cycle life,***
- ***cell voltage curve as function of SOC***
- ***cell resistance (charge and discharge) curve as function of SOC***
- ***cell capacity,***
- ***battery configuration including series and parallel cell configuration,***
- ***working and peak power, weight and***
- ***Recommended minimum and maximum operational SOC.***

Battery/Energy Storage Cooling System

Manufacturer		
Type		
Model number		
Description		
Max power consumption		kW

Total cooling system capacity (gallons)		gallons
Radiator fan manufacturer		
Fan speed/control type (mech/elect/hyb)		

Surge tank capacity		gallons
Surge tank material		
Overheat alarm temperature		degrees F
Shutdown temperature settings		degrees F

Ultra-capacitor

Manufacturer	
Model number	

Ultra-capacitor ratings: Provide data sheet for energy efficiency, estimated calendar life, cycle life, voltage and capacitance (each capacitor and each module),number of modules, series and parallel configuration, working and peak power, and weight

Batteries Management System

Manufacturer	
Type	
Model number	
Description	

Motor

Manufacturer	
Model number/version	
Max power at speed (kW @ rpm)	
Max torque at speed (N-m @ rpm)	
Average efficiency (%)	
Max motor speed (rpm)	
Type	
Cooling	

Please provide torque-speed and efficiency curve for the motor.

Fire Suppression

Manufacturer				
Model number				
Number of detectors		fire		methane
Type of detector	□ Thermal □ Optical			
Battery backup	□ Yes □ No			

Ground Fault Detection

Manufacturer	
Model number	

Bumpers

Manufacturer	

Type	

Air Suspension	Front	Middle	Rear
Air spring manufacturer			
Air spring quantity per axle			
Shock absorber manufacturer			
Shock absorber quantity per axle			

Steering

Pump manufacturer		
Pump model number		
Steering gear manufacturer		
Steering gear model number		
Steering gear type		
Steering wheel diameter		inches
Maximum effort at steering wheel*		

* Unloaded stationary coach on dry asphalt pavement

Wheels

Manufacturer	
Type	
Size	
Mounting type	
Bolt circle diameter	
Protective coating	

Tires

Manufacturer	
Type	
Size	
Load range/air pressure	

Door System

Door panels	**Manufacturer**	**Type**
Front door		
Center door (1)		
Center door (2)		
Rear door		

Actuating mechanism (air, electric, spring, other)

Manufacturer	
Front door	
Center door (1)	
Center door (2)	
Rear door	

Heating and Ventilating Equipment

Heating system capacity		Btu
Air conditioning system capacity		Btu
Ventilating capacity		CFM per passenger

Air Conditioner

Manufacturer and model	
Refrigerant type	
Max electrical load (kW)	

Driving heater

Manufacturer	
Type	
Model number	
Capacity	
Max electrical load (kW)	

Auxiliary heater

Manufacturer	
Type	
Model number	
Capacity	
Max electrical load (kW)	

Floor heaters

Manufacturer	
Type/number	

Model number	
Capacity	
Max electrical load (kW)	

Passenger Loading System

Manufacturer	
Type (hydraulic, electric or both)	
Model number	
Capacity (lbs.)	

Dimensions

Width of ramp		inches
Length of ramp		inches

Cycle times	**Normal idle**		**Fast idle**	
Stowed to ground		seconds		seconds
Ground to stow		seconds		seconds

Electronics

Video system manufacturer	
Video system model number	
Number of cameras	
Multiplex system manufacturer	
Multiplex system model number	
Automatic passenger counter system manufacturer	
Automatic passenger counter system model number	
Destination sign manufacturer	
Destination sign model number	
AVL/AVM system manufacturer	
AVL/AVM system model number	
Passenger information system manufacturer	
Passenger information system model number	
Signal prioritization system manufacturer	
Signal prioritization system model number	

Coach Body Fittings

Passenger windows manufacturer	

Exterior/interior mirrors

Size	
Manufacturer	
Model number	

Manufacturer part numbers	

Bicycle racks

Manufacturer	
Model number	

Paint system

Manufacturer	
Type	

Operator control layout diagram:

Charging Station Data Sheet

Battery Charging

Depot Charging Station Equipment & Charger Interface

Manufacturer	
Model number	
Charging Equipment Description	
Charging Equipment Certifications (i.e., UL, ETL, etc.)	
Charger Interface Description	
Cable Management	
Efficiency (%)	
Peak Power (kW)	
Charge Voltage (VDC)	
Charge Current (A)	

On Route Inductive Charging Station Equipment

Manufacturer	
Model number	
Description	
Certifications (i.e., UL, ETL, etc.)	
Cable Management	
Grid-to-Battery Efficiency (%)	
Rated Power (kW)	
Charge Voltage (VDC)	
Charge Current (A)	
System Ambient Temperature Range (deg F)	
Power Supply Cooling (water/air)	
Primary Coil/Pad Cooling (water/air)	
Secondary Coil/Pickup Side Cooling (water/air)	
Input Voltage (V, Hz)	
Input Current at System Rated Power (A)	
Mains Supply Breaker Requirement (A)	
Above Ground Power Supply Equipment	

Dimensions	
Below Ground Equipment Dimensions	
Connect Time	
Disconnect Time	
Alignment Tolerance	
Airgap Tolerance	

EXHIBIT V

MINIMUM MILESTONES AND SCHEDULE FORM

Milestone	County End Date	Proposed Date
Issue Bus RFP	11/14/2014	
Pre-Bid Meeting	12/04/2014	
Deadline for Contractor Questions	12/09/2014	
Bus Proposal Submittal Due Date	12/17/2014	
County Announcement of Award	01/16/2015	
Contract Issued	02/20/2015	
Bus Build		
Pre-Production Meeting		
Altoona Test Complete & Report delivered to County		
Approve Final Concept Drawings/Layout		
Approve Pre-Production Build Specifications		
Start Bus Production		
Bus Build Completion		
Bus Pre-Delivery Acceptance and Road Test Complete		
Inductive Charging Test and Validation		
Deliver Electric Buses		
Onsite Testing with Installed Infrastructure		
Training Complete		
Route Validation		
Deploy Buses in Revenue Service		
Inductive Charging Station Build		
Start Site Construction		
Complete Charge Equipment Build and Test		
Deliver Inductive Charging Station Equipment		
Install, Test and Verify Inductive Charge Equipment		
Station Construction Complete		
Depot Charge Station Build		
Complete Charge Equipment Build and Test		
Deliver Depot Charging Station Equipment		
Install, Test and Verify Depot Charge Equipment		
Station Construction Complete		

EXHIBIT VI

FEDERAL MOTOR VEHICLE SAFETY STANDARDS FORM

CERTIFICATION OF COMPLIANCE WITH FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS)

The Contractor, _____
(Manufacturer's Name)

Certifies that the buses to be manufactured under this Contract, will be manufactured in accordance with all Federal Motor Vehicle Safety Standards in effect at the time of manufacture. Test reports to substantiate compliance with FMVSS shall be provided to COUNTY upon request at any time during the duration of the Contract.

DATE _____

COMPANY NAME _____

SIGNATURE _____

TITLE _____

EXHIBIT VII

NEW BUS MANUFACTURING INSPECTION GUIDELINES

Pre-production meeting

Responsibilities

County

- Provides conformed copy of technical requirements.
- Recommended staff to be involved may include the following:
    - Project manager
    - Technical engineer
    - Contract administrator
    - Quality assurance administrator
    - Warranty administrator
- Process for inspector's role (to deal with County) for negotiated changes after freeze date.
- Contractual requirements:
    - Milestones
    - Documentation
    - Title requirements
    - Deliverables
    - Payments
    - Reliability tracking

Manufacturer

- Identifies any open issues.
- Recommended staff to be involved may include the following:
    - Project manager
    - Technical engineer(s)
    - Contract administrator
    - Quality assurance administrator
- Warranty administrator
- Production flow (buses/week, shifts).
- Delivery schedule and offsite component build-up schedule.
- Bus QA documentation (including supplier application approvals and/or any certifications required for the specific production).
- Communication flow/decision making.

Inspector

- Agree on decisions inspectors can and cannot make.
- Primary contact for problems, etc.
- Production flow process (description of manufacturing by station).
- Factory hours (manage inspection schedule based on production hours).
- Plant rules.
- Safety requirements.
- Orientation requirements.
- Work environment.
- Inspector's office space (per contract).

NOTE: As a result of this meeting, documentation should be produced detailing final production requirements and the planned configuration of the bus.

Build schedule

The bus manufacturer's contract administrator shall supply a fleet build production schedule based on the dates in the Notice to Proceed, and a description of the manufacturer's schedule for plant operations.

The production schedule should contain specific milestone dates, such as:

- First vehicle on production line (date on which any work will begin);
- First vehicle off production line;
- First vehicle through manufacturer's quality assurance inspections;
- First vehicle shipped to the County;
- Last vehicle on production line;
- Last vehicle off production line; and
- Last vehicle shipped to the County.

Plant tour (if meeting at OEM's location)

The County will review the entire process from start to finish and review the work completed at each line station, including quality control measures

Vehicle production

The contractor shall conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to the County. These pre-delivery tests shall include visual and measured inspections, as well as testing the total bus operation. Pre-delivery tests shall include a system integration test that includes charging the battery system using the same type of charging equipment and interfaces that will be installed at the County's on route and depot charging stations. The tests shall be conducted and documented in accordance with written test plans approved by the County. The underfloor equipment shall be available for inspection by the resident inspectors, using a pit or bus hoist provided by the contractor. A hoist, scaffold or elevated platform shall be provided by the contractor to easily and safely inspect bus roofs. Delivery of each bus shall require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery shall be provided by the contractor.
An executed copy of the authorization shall accompany the delivery of each bus.

Additional tests may be conducted at the County's discretion to ensure that the completed buses have attained the required quality and have met the requirements in the County Battery Electric Bus RFP, Section 6: Technical Specifications. The County may, prior to commencement of production, demand that the contractor demonstrate compliance with any requirement in that section if there is evidence that prior tests have been invalidated by the contractor's change of supplier or change in manufacturing process. Such demonstration shall be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing shall be recorded on appropriate test forms provided by the contractor and shall be conducted before acceptance of the bus.

The pre-delivery tests shall be scheduled and conducted with 30 days' notice so that they may be witnessed by the resident inspectors, who may accept or reject the results of the tests. The results of pre-delivery tests, and any other tests, shall be filed with the assembly inspection records for each bus.

Visual and measured inspections

Visual and measured inspections shall be conducted with the bus in a static condition. The purpose of the inspection testing includes verification of overall dimension and weight requirements, that required components are included and are ready for operation, and that components and subsystems designed to operate with the bus in a static condition do function as designed.

Total bus operation

Total bus operation shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the bus as a system and to verify the functional operation of the subsystems that can be operated only while the bus is in motion.

Each bus shall be driven for a minimum of 100 miles during the road tests. If requested, computerized diagnostic printouts showing the performance of each bus shall be produced and provided to the County. Observed defects shall be recorded on the test forms. The bus shall be retested when defects are corrected and adjustments are made. This process shall continue until defects or required adjustments are no longer detected.

Post-delivery tests

The County shall conduct acceptance tests on the buses. These tests shall be completed within 30 days after bus delivery and shall be conducted in accordance with the County's written test plans. The purpose of these tests is to identify defects that have become apparent between the time of bus release and delivery to the County. The post-delivery tests shall include visual inspection and bus operations. No post-delivery test shall apply new criteria that are different from criteria applied in a pre-delivery test.

Buses that fail to pass the post-delivery tests are subject to non-acceptance. The County shall record details of all defects on the appropriate test forms and shall notify the contractor of acceptance or non-acceptance of each bus, after completion of the tests. The defects detected during these tests shall be repaired according to procedures defined in the contract.

Vehicle acceptance

In order to assess the contractor's compliance with the Technical Specifications, the County and the contractor shall, at the pre-production meeting, jointly develop a Configuration and Performance Review document for review of the buses. This document shall become part of the official record of the pre-production meeting.

Potential dimensional/performance tests that may be included in the Configuration and Performance Review include the following:

- Complete electrical system audit
- Dimensional requirements audit
- Seating capacity
- Water test
- Water runoff test
- Function test of systems/subsystems and components
- Sound/noise level tests
- Vehicle top speed
- Acceleration tests
- Brake stop tests
- Airflow tests
- PA function tests
- Air/brake system audit
- Individual axle weight
- Standee capacity
- Body deflection tests
- Silent alarm function test
- Interior lighting
- Exterior lighting
- Gradeability test
- Kneeling system function
- HVAC pulldown/heat

- Speedometer
- Outside air infiltration (smoke)
- Wheelchair ramps
- Propulsion System performance qualification
    - This test shall be jointly conducted by the contractor, propulsion system integrator and charging system supplier (including but not limited to energy storage charge acceptance, battery management system, electrical inputs and engine protection system).
- Transmission performance qualifications
    - This test shall be jointly conducted by the Contractor and transmission manufacturer (including but not limited to retarder operation, heat exchanger, interface with ABS and electrical inputs).

Buy America audit

A post-delivery Buy America audit is required for federally funded bus procurements (see 49 CFR Part 663 for additional information). The onsite resident inspectors are to monitor the production processes to verify compliance with final assembly requirements identified by the Buy America pre-award audit. This audit is to verify compliance with final assembly requirements and final documentation of Buy America compliance and must be completed prior to title transfer.

NOTE: The Buy America post-delivery audit should be performed following completion of the first serial production bus. In addition to monitoring of the production processes, the County must verify compliance that more than 60 percent of the costs of all components are produced in the United States. Finally, the County must execute the required certificates.

Resident Inspector responsibilities

The resident inspection process for the serial production of the buses follows bus production schedule. Resident inspectors should represent the County for all build-related issues (quality, conformance, etc.). Resident inspectors can also address contractual type issues but should only do so under the consult of the County's contracts administrator. Resident inspectors are sent to the manufacturer's facility according to a Resident Inspection Schedule. Typically, one or two inspectors arrive on site at the manufacturing facility about one week prior to actual production to set up the resident inspection process and to begin preliminary quality assurance inspections for items such as power plant build-up and wire harness production, and to inspect incoming parts, fasteners, fluids, etc., that will be used in the production of the buses. During the serial production of the buses, the resident inspectors should monitor the production of each bus, verifying the quality of materials, components, sub-assemblies and manufacturing standards. In addition, the configuration of each vehicle should be audited using the vehicle manufacturer's Build Specification and other documents to ensure contract compliance and uniformity.

Inspector rotation/scheduling

During the resident inspection phase, a single inspector or multiple inspectors could be used. At the discretion of the County, the inspector may be on site for all, or significant portions, of the build process. The inspectors could be rotated on a biweekly to monthly basis as required.

Resident inspector orientation

A resident inspector orientation by the bus manufacturer should take place upon the arrival of the initial inspection team. The orientation should include expectations for the use of personal protective equipment (safety shoes, safety glasses, etc.), daily check-in and check-out requirements, lines of communication, use of production documents such as speed memos and line movement charts, inspector/production meetings, inspector office arrangements, and anything else pertinent to the inspection team's involvement during the build. Many of the above items should already be formalized during the pre-production meeting.

Audits, inspections and tests

The resident inspection process monitors the production of each vehicle. Inspection stations should be strategically placed to test or inspect components or other installations before they are concealed by

subsequent fabrication or assembly operations. These locations typically are placed for the inspection of underbody structure, body framing, electrical panels and harnesses, air and hydraulic line routings, installation of insulation, power plant build-up and installation, rust inhibitor/undercoating application, floor installation, front suspension alignment, and other critical areas.

Vehicle inspections

Each bus is subjected to a series of inspections after the bus reaches the point of final completion on the assembly line. Typically, the vehicle manufacturer performs its own quality assurance inspections following assembly line completion before releasing each bus to the resident inspectors. The inspections for each vehicle are documented, signed off upon passing and included in the vehicle record.

These are the typical inspections performed on each bus by the resident inspectors:

- Water test inspection
- Road test inspection
- Interior inspection (including functionality)
- Hoist/undercarriage inspection
- Exterior inspection (including roof)
- Electrical inspection
- Wheelchair ramp/lift inspection

Water test inspection

The water test inspection checks the integrity of the vehicle's body seams, window frame seals and other exterior component close-outs for their ability to keep rainwater, road splash, melting snow and slush, and other exterior water from entering the inside of the vehicle. The vehicle's interior is inspected for signs of moisture and water leaks. To perform the leak inspection, interior ceiling and side panels are removed, and access doors are opened. If any moisture or water is detected, then the source of the leak will be located and repaired by the manufacturer, and the vehicle will be tested again.

Road test inspection

The road test inspection checks all the vehicle's systems and sub-systems while the vehicle is in operation. Typically, the road test inspection is performed immediately following the water test inspection to reveal any standing water that may be present due to a leak, but was not noticed during the "static" water test. Objectionable vibrations, air leakage and other factors that affect ride quality are recorded and reported to the vehicle manufacturer for resolution. Vehicle stability, performance, braking and interlock systems, HVAC, and other critical areas are checked to ensure that the vehicle is complete and ready to provide safe and reliable service.

The following tests may be performed and recorded during the road test:

- Acceleration test
- Top speed test
- Gradeability test
- Service brake test
- Parking brake test
- Turning effort test
- Turning radius test
- Shift quality
- Quality of retarder or regenerative braking action
- Engaging Charging Station

During the road test, a vehicle may be taken to a weigh station to record the vehicle's front axle weight, rear axle weight and total vehicle (curb) weight.

Interior inspection

The interior inspection checks the fit and finish of the interior installations.

In addition, the inspection also verifies the installation and function of systems and subsystems according to the Build Specification. All systems and functions accessed from the interior are inspected for functionality, appearance and safety.

Examples of systems/functions inspected include the following:

- Interior and exterior lighting controls
- Front and rear door systems
- Flooring installation
- Passenger and operator's seat systems
- Wheelchair securement and ramp systems
- Fire suppression system
- Electrical installations (multiplex, tell-tale wiring, panels, etc.)
- Window systems and emergency escape portals
- Operator dash/side panel controls/indicators

Hoist/undercarriage inspection

The hoist/undercarriage inspection checks the installation of components, wiring, air lines, presence of fluid leaks, etc., located under the vehicle. Typically, this inspection is performed following the road test. The vehicle is lifted onto a hoist or pulled over a pit for the inspection. Areas inspected are the front suspension, air bags, airline routings, electrical connections and routings, drive-train components, linkages, and any other system or component that may be prone to early failure due to inadequate installation techniques. All lines, cables, hoses, etc., are inspected for proper securement and protection to prevent rubbing, chafing or any other condition that could result in a failure. The engine/powerplant and HVAC compartments are also inspected during this time.

Exterior inspection

The exterior inspection checks the fit and finish of components installed on the exterior of the vehicle. Access panels are opened and accessories are inspected for proper installation. In addition, vehicle paint, graphics and proper decals are also inspected. Acceptable paint finish quality (orange peel, adhesion, etc.) should be agreed on with the vehicle manufacturer prior to production to ensure consistency of inspections.

Electrical inspection

The vehicle's main electrical panels and other sub-panels are inspected for proper components, to include relays, fuses, modules, terminal strips, decals, etc. In addition, electrical harnesses are inspected for proper wiring and termination techniques, bulkhead protection, looming and other items that could result in future electrical failure. Onboard vehicle compartment schematics are verified for accuracy.

Wheelchair ramp inspection

The wheelchair ramp assembly is inspected for proper installation and performance. Clearances critical to the operation of the ramp are verified, and the ramp's electrical systems are inspected to ensure appropriate wire routings and protection. The successful integration of the ramp assembly into the vehicle is verified, and the vehicle interlocks are checked during automatic and manual ramp operation.

Audits

During serial production of the bus's quality assurance inspection, tests may be performed to ensure that the manufacturer's quality standards are being followed. These inspection audits could be on items such as torque wrench calibrations, proper techniques for fastener installations, proper use and type of adhesives, use of correct installation drawings on the production line, etc.

Communications

The lines of communications, formal and informal, should be discussed and outlined in the pre-production meeting. As previously discussed, resident inspectors should represent the County for all bus-build related issues (quality, conformance, etc.). Resident inspectors can relay communications addressing contractual type issues but should do so only under the consult of the County's contracts administrator. Actual personnel contacts for the manufacturing facility should be established during resident inspector orientation. These contacts could include quality assurance, production, material handling, engineering, and buy-off area personnel.

Documentation

The following documents/reports are typically generated during the bus build process:

- Vehicle Build Specification
- Sales Order
- Pre-production meeting notes
- Prototype and production correspondence (vehicle build file)
- Manufacturer's Vehicle Record (Warranty file)
  - Vehicle line documents
- Serialization documents (Warranty file)
  - Alignment verification
  - Brake testing
  - HVAC testing and checkout
  - Manufacturer's QA checklist and signoff
    - Weight Slip (Prototype & Warranty file)
    - Prototype Performance Tests document (vehicle build file)
  - Acceleration Test
  - Top Speed Test
  - Gradeability Test
  - Interior Noise Test A – Stationary
  - Interior Noise Test B – Dynamic
  - Exterior Noise Test A – Pull Away
  - Exterior Noise Test B – Pass-By
  - Exterior Noise Test C – Curb Idle
  - Turning Radius Test
  - Turning Effort Test
  - Parking Brake Test
  - Service Brake Test
    - Vehicle Acceptance Inspections – Production (Warranty file)
  - Water Test Inspection Report
  - Road Test Inspection Report
  - Interior Inspection Report
  - Hoist/Undercarriage Inspection Report
  - Exterior Inspection Report
  - Electrical Inspection Report
  - Wheelchair Inspection Report
- Speed Memos (Warranty file)
- County Vehicle Inspection record (Warranty file)
- Release for Delivery documentation (Warranty file)
- Post-Production Acceptance – Certificate of Acceptance (Accounting)
- Post-Delivery Inspection Report – (Fleet Management & Warranty files)

Vehicle release for delivery

Upon satisfactory completion of all inspection, audit and test criteria, and resolution of any outstanding issues affecting the purchase of any or all buses, proper documentation (the Release for Delivery) is signed by the designated resident inspector authorizing the bus manufacturer to deliver the vehicle to the County's facility, where it will undergo a post-delivery inspection process and final acceptance. The satisfactory sign-off of the Release for Delivery should complete the resident inspector's duties for each bus. In final preparation for delivery, the bus manufacturer may request the resident inspector to do a final walk-through of the bus after it has been cleaned and prepped for shipping.

Post-delivery and final acceptance

The County shall conduct acceptance tests on each delivered bus. These tests shall be completed within 15 days after bus delivery and shall be conducted in accordance with the County's written test plans. The purpose of these tests is to identify defects that have become apparent between the time of bus release and delivery to the County. The post-delivery tests shall include visual inspection, along with a verification of system(s) functionality and overall bus operations. No post-delivery test shall apply new criteria that are different from criteria applied in a pre-delivery test.

Buses that fail to pass the post-delivery tests are subject to non-acceptance. The County shall record details of all defects on the appropriate test forms and shall notify the contractor of acceptance or non-acceptance of each bus within five days after completion of the tests. The defects detected during these tests shall be repaired according to procedures defined in the contract after non-acceptance.

Certificate of Acceptance

- **Accepted**
- **Not accepted:** In the event that the bus does not meet all requirements for acceptance. The Countyy must identify reasons for non-acceptance and work with the OEM to develop a timeline of addressing the problem for a satisfactory resolution and redelivery.

EXHIBIT VIII

NEW CHARGING STATION INSPECTION GUIDELINES

Pre-production meeting

Responsibilities

County

- Provides conformed copy of technical requirements.
- Recommended staff to be involved may include the following:
- Project manager
- Technical engineer
- Contract administrator
- Quality assurance administrator
- Warranty administrator
- Process for inspector's role (to deal with County) for negotiated changes after freeze date.
- Contractual requirements:
- Milestones
- Documentation
- Title requirements
- Deliverables
- Payments
- Reliability tracking

Manufacturer

- Identifies any open issues
- Recommended staff to be involved may include the following:
- Project manager
- Technical engineer(s)
- Contract administrator
- Quality assurance administrator
- Warranty administrator

- Delivery schedule and offsite component build-up schedule
- Charging Equipment QA documentation (including supplier application approvals and/or any certifications required for the specific production)
- Communication flow/decision making

Inspector

- Agree on decisions inspectors can and cannot make.
- Primary contact for problems, etc.
- Charging Station Construction and Charging Equipment Installation
- Safety requirements
- Work environment
- Inspector's office space (per contract)

NOTE: As a result of this meeting, documentation should be produced detailing final production requirements and the planned configuration of the bus.

Charging Station Construction and Charging Equipment Installation Schedule

The Contractor shall work with the County to develop a schedule for charging station construction and installation of charging equipment and charge interface for the on route and depot charging stations. The construction and installation schedule should contain specific milestone dates, such as:

- Contractor provides County with charging equipment specifications and requirements
- County develops site plans and civil, mechanical, and electrical drawings for on route and depot charging stations
- Contractor reviews and approves site plans and civil, mechanical, and electrical drawings for on route and depot charging stations
- County prepares sites for on route and depot charging stations
- Contractor oversees the installation of charging equipment and charge interface at on route and depot charging stations
- Contractor tests and commissions charging stations
- County conducts acceptance testing of charging stations

All charging stations must be commissioned and operational prior to the delivery of all project buses.

Charging Equipment production

The contractor shall conduct acceptance tests at its plant on each component of the charging equipment and charger interface following completion of manufacture and before delivery to the County. These pre-delivery tests shall include visual and measured inspections, as well as testing the operation of the equipment. The tests shall be conducted and documented in accordance with written test plans approved by the County.

Delivery of charging equipment shall require written authorization of the primary resident inspector. Authorization forms for the release of charging equipment for delivery shall be provided by the contractor. An executed copy of the authorization shall accompany the delivery of charging equipment.

Additional tests may be conducted at the County's discretion to ensure that the charging equipment has attained the required quality and have met the requirements in the COUNTY Battery Electric Bus RFP, Section 6: Technical Specifications. The County may, prior to commencement of production, demand that the contractor demonstrate compliance with any requirement in that section if there is evidence that prior tests have been invalidated by the contractor's change of supplier or change in manufacturing process. Such demonstration shall be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing shall be recorded on appropriate test forms provided by the contractor and shall be conducted before acceptance of the charging equipment.

The pre-delivery tests shall be scheduled and conducted with 30 days' notice so that they may be witnessed by the resident inspectors, who may accept or reject the results of the tests. The results of pre-delivery tests, and any other tests, shall be filed with the assembly inspection records for the charging equipment.

Visual and measured inspections

Visual and measured inspections of charging equipment and charging interface shall be conducted with the bus in a static condition. The purpose of the inspection testing includes verification of overall dimension and weight requirements, that required components are included and are ready for operation, and that components and subsystems designed to operate with the bus in a static condition do function as designed.

Resident Inspector responsibilities

Resident inspectors should represent the County for all build-related issues (quality, conformance, etc.). Resident inspectors can also address contractual type issues but should only do so under the consult of the County's contracts administrator. Resident inspectors are sent to the manufacturer's facility according to a

Resident Inspection Schedule. Typically, one or two inspectors arrive on site at the manufacturing facility about one week prior to actual production to set up the resident inspection process and to begin preliminary quality assurance inspections and to inspect incoming parts that will be used in the production of the charging equipment. During the production of the charging equipment, the resident inspectors should monitor the production of the equipment, verifying the quality of materials, components, sub- assemblies and manufacturing standards. In addition, the configuration the charging equipment should be audited using the manufacturer's Build Specification and other documents to ensure contract compliance and uniformity.

Inspector rotation/scheduling

During the resident inspection phase, a single inspector or multiple inspectors could be used. At the discretion of the County, the inspectors may be on site for all, or significant portions, of the build and testing process. The inspectors could be rotated on a biweekly to monthly basis as required.

Resident inspector orientation

A resident inspector orientation by the manufacturer should take place upon the arrival of the initial inspection team. The orientation should include expectations for the use of personal protective equipment (safety shoes, safety glasses, etc.), daily check-in and check-out requirements, lines of communication, use of production documents such as speed memos and line movement charts, inspector/production meetings, inspector office arrangements, and anything else pertinent to the inspection team's involvement during the build. Many of the above items should already be formalized during the pre-production meeting.

Audits, inspections and tests

The resident inspection process monitors the production of charging equipment. Inspection stations should be strategically placed to test or inspect components or other installations before they are concealed by subsequent fabrication or assembly operations.

Charging Equipment inspections

Charging Equipment is subjected to a series of inspections after the equipment reaches the point of final completion on the assembly line. Typically, the manufacturer performs its own quality assurance inspections following assembly line completion before releasing the equipment to the resident inspectors. The inspections for charging equipment are documented, signed off upon passing and included in the charging equipment record.

Audits

During production of the equipment quality assurance inspection, tests may be performed to ensure that the manufacturer's quality standards are being followed.

Communications

The lines of communications, formal and informal, should be discussed and outlined in the pre-production meeting. As previously discussed, resident inspectors should represent the County for all equipment-build related issues (quality, conformance, etc.). Resident inspectors can relay communications addressing contractual type issues but should do so only under the consult of the County's contracts administrator. Actual personnel contacts for the manufacturing facility should be established during resident inspector orientation. These contacts could include quality assurance, production, material handling, engineering, and buy-off area personnel.

Documentation

The following documents/reports are typically generated during the equipment build process:

- Charging Equipment Build Specification
- Sales Order
- Pre-production meeting notes

- Prototype and production correspondence
- Manufacturer's Production Record (Warranty file)
- Vehicle line documents
- Serialization documents (Warranty file)
- Manufacturer's QA checklist and signoff
    - Prototype Performance Tests document (build file)
    - Equipment Acceptance Inspections – Production (Warranty file)
    - County Equipment Inspection record (Warranty file)
    - Release for Delivery documentation (Warranty file)
    - Post-Production Acceptance – Certificate of Acceptance (Accounting)
    - Post-Delivery Inspection Report – (Fleet Management & Warranty files)

Equipment release for delivery

Upon satisfactory completion of all inspection, audit and test criteria, and resolution of any outstanding issues affecting the purchase of any or all charging equipment, proper documentation (the Release for Delivery) is signed by the designated resident inspector authorizing the manufacturer to deliver and install the equipment at the County's designated charging stations, where it will undergo a post-delivery inspection process and final acceptance. The satisfactory sign-off of the Release for Delivery should complete the resident inspector's duties for charging equipment. In final preparation for delivery, the bus manufacturer may request the resident inspector to do a final walk-through of the bus after it has been cleaned and prepped for shipping.

Post-delivery and final acceptance

The County shall conduct acceptance tests on charging equipment. These tests shall be completed within 30 days after delivery and installation of equipment and delivery of the buses and shall be conducted in accordance with the County's written test plans. The purpose of these tests is to identify defects that have become apparent between the time of equipment release and delivery and installation at the County's designated charging stations. The post-delivery tests shall include visual inspection, along with a verification of system(s) functionality and overall operations. No post-delivery test shall apply new criteria that are different from criteria applied in a pre-delivery test.

Equipment that fail to pass the post-delivery tests are subject to non-acceptance. The County shall record details of all defects on the appropriate test forms and shall notify the contractor of acceptance or non-acceptance of charging equipment within five days after completion of the tests. The defects detected during these tests shall be repaired according to procedures defined in the contract after non-acceptance.

Certificate of Acceptance

- **Accepted**
- **Not accepted:** In the event that the equipment does not meet all requirements for acceptance. The County must identify reasons for non-acceptance and work with the Contractor to develop a timeline of addressing the problem for a satisfactory resolution and redelivery.
- **Conditional acceptance:** In the event that the charging equipment does not meet all requirements for acceptance, the County may conditionally accept the equipment pending receipt of contractor furnished materials and/or labor necessary to address the identified issue(s)

EXHIBIT IX

CONTRACTOR SERVICE AND PARTS SUPPORT DATA

Location of nearest Technical Service Representative to County

Name:
Address:
Telephone:
Describe technical services readily available from said representative:

Location of nearest Parts Distribution Center to County:

Name:
Address:
Telephone:
Describe the extent of parts available at said center:

Policy for delivery of parts and components to be purchased for service and maintenance:

Regular method of shipment:
Cost to County: